



FRIDAY, MARCH 30, 1894

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## Contributions.

## Standard Time in Europe.

COPENHAGEN, March 6, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:  
I beg to correct a note in the *Railroad Gazette* of Feb. 16 about standard time in Europe. In Denmark we have made use of the central European time since Jan. 1, 1894, but in Norway they still have the old time.

CHR. SEEBYE.

## The Thorne-Trojan Draft Rigging.

The *Trojan Car Coupler Co.*,  
TROY, N. Y., March, 13, 1894.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

This company desires to inform the public that a wrong impression seems to have been given by the publication of a description of the Thorne-Trojan draft rigging in which it was stated that this company is "arranging to put this device on the market." The facts are that we have simply secured the rights, from the owner of the device, to use and sell it to railroads in connection with the Trojan coupler, which rights are not exclusive and may be secured by any railroad or other coupler company.

THE TROJAN CAR COUPLER CO.

## Cost of Working Liverpool Overhead Railway.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* of March 16, page 190, appears a table giving the cost of working, etc., of the Liverpool Overhead Railway, from which I rearranged the following little table:

|           | Train-miles. | Pence. | Cents. |
|-----------|--------------|--------|--------|
| July      | 39,250       | 3 411  | 6.978  |
| August    | 41,430       | 3 701  | 7.612  |
| September | 10,610       | 4 075  | 8.364  |

Hence during these three months 121,320 train-miles averaged 3.743 pence, or 7.591 cents, per train-mile. On page 193 you publish an abstract of the first half-yearly report ending Dec 31, 1893. The train-mileage, 243,539, is pretty close to twice that of the three months mentioned. The operating expenses were 13,773 pounds sterling, which is 13.573 pence, or 27.526 cents, per train mile; that is 3½ times as much as the mean cost given in the table. Of course, one who is familiar with these matters will see that the costs summed up in the table cover only the items there specified, and he will notice that a good many items which cause expense somewhat near that arising from the items tabulated have been omitted. The trains are composed of two light cars each.

The latest analysis of the cost per train-mile on the Manhattan Railway of New York which I have at hand, is for the year ending Sept. 30, 1887. Assuming that these trains were made up of four cars, the cost for trains of two cars would be as follows: Motive power, 12.6; cars, 5.72; station and other expenses, 6.95; way and structure, 2.86; general, 2.87; total, 31 cents.

ENGINEER.

## The Monthly Meetings of the Mechanical Engineers.

NEW YORK, March 26, 1894.

## TO THE EDITOR OF THE RAILROAD GAZETTE:

The *American Machinist* and the *American Engineer* in commenting upon a letter printed in the *Railroad Gazette* of February 9 failed to meet the argument of the writer, who did not object to the meetings *per se*, but merely to the fact that they were not recognized as official meetings of the society, and that no provision had been made for printing either the papers or the discussions in the *Transactions* by which members would receive in their own publication a complete record of proceedings.

One of the most important perquisites of membership in such a society is the series of printed transactions, and to omit from them what may prove to be the most

important papers of the year, would eventually lead to dissatisfaction. As a matter of fact, the meetings are already assuming so important a character that they threaten to surpass the more profound official gatherings. The paper read at the last meeting was so profusely illustrated that one of the journals in the syndicate was obliged to admit that it could not find space for its complete reproduction with cuts. Here may be seen at once the objection to dependence upon the technical press for complete reports of these meetings. An editor must recognize the fact that each issue of his journal should contain a certain variety of matter, and his space is ordinarily restricted. The printed transactions of a society, however, are published solely for its members and within reasonable limits they are supposed to contain, and ordinarily do contain, the complete proceedings of the meetings, regardless of space.

The statement made by one editor that it would be necessary to increase the dues in order to meet the extra expense of reporting these monthly meetings is not founded on fact. Every movement that increases the popularity of a society brings in new members, and the revenue from this source should be sufficient for the purpose. In fact, the real object of a technical society, as set forth in the constitutions of most of them, is the holding of meetings and the distribution of the publications, which are a record of their proceedings. If the monthly meetings are to be of any importance there can be no legitimate reason for withholding official recognition from them, and if this cannot be done under the existing rules it simply shows that those rules are not being interpreted for the welfare of the society, but rather to suit the views or convenience of those who attempt to expound them.

ENGINEER.

## Rapid Transit in Baltimore.

BY J. C. RANSOM.

A few minutes' study of a map of Baltimore will reveal the outlines of the rapid transit problem there. The city hall, postoffice and court buildings lie a little north of the water front, and in the vicinity are the principal business houses of the city. The task presented is the extension of lines from this center into all parts of the city, so as to enable people to go and come between their residences, and the business section as directly and quickly as possible. There have been no remarkable engineering difficulties to overcome, and the problem is practically solved to the extent of what may be called "medium transit" by electric and cable cars. With the single exception of the Lake Roland Elevated structure over North street these cars are all on the surface, and are allowed to run at the rate of six miles an hour in the crowded streets and 15 miles an hour in the suburbs.

Transportation facilities had been pretty well supplied during the horse-car period, so far as covering the ground was concerned. Lines had been extended east to Canton and Highlandtown, southeast to Locust Point, south to Ferry Bar, west to the city boundary, northwest to Druid Hill Park and Hampden, north to Waverly and Towson and northeast to Hall's Springs, while the centre of the city was traversed by a network of tracks running in every direction. All that was required, therefore, in the introduction of rapid transit was to fit out these existing routes with cables or electricity, and the results achieved have been very satisfactory, alike to the investing companies and the public which they serve. Medium transit, or street cars which stop at all crossings, has been provided, and the change from the horse car to the electric or cable arrangement for nearly 500 miles of single track will have been accomplished within a period of less than five years. In the beginning there were 21 lines of horse cars running in Baltimore, but these have been purchased and consolidated into five rapid transit systems, having large capital, many miles of track, valuable franchises and opportunities to expand and develop into extensive and profitable enterprises. Already the electric lines are pushing into the country, and the time probably is not far distant when there will be cars running regularly to Sparrow's Point, and possibly to Annapolis, to Ellicott City and to the Gunpowder River as they now do to Arlington, Lake Roland and Towson, not to mention the much talked of Baltimore-Washington boulevard.

The Baltimore Traction Company was the first to inaugurate rapid transit in Baltimore, its cars starting May 23, 1891. This is a branch of the famous Philadelphia Traction Company, and was organized in Baltimore in the fall of 1889, having a capital stock of \$5,000,000, with the privilege of increasing it to \$10,000,000. The additional \$5,000,000 in stock was authorized about a year ago, and the company has besides \$4,500,000 outstanding bonds carrying five and six per cent. It first purchased the old Citizens' Line and proceeded to fit it out with cables. This opened a direct passage between the eastern part of the city and Druid Hill Park, while the Gilmore street branch of the line afforded rapid transit facilities for West Baltimore. Since then the Traction Company has bought in several additional lines, and at present owns 78 miles of track, 15 miles being operated with cables and 63 miles by trolley and horse cars. The tracks of this system, as well as all others in Baltimore, are 5 ft. 4½ in. gage, and the Traction Company has laid 68, 78 and 80-pound girder rails. Its equipment consists of 250 cars, including 60 grip cars, 45 motors and 40 trailers. The electric equip-

ment is of the Westinghouse pattern, and the cable power houses contain Corliss and Macintosh engines.

The Baltimore City Passenger Railway Company is the oldest street railroad organization in Baltimore, its first franchise bearing date of March 14, 1859. Its lines traverse Baltimore street from end to end, extend out Gay street and run down to Ferry Bar, while the Green line reaches from Druid Hill Park to Canton, a distance of nearly 11 miles. Another branch goes out Madison avenue, another up Calvert and Charles streets, and a third goes by way of Asquith street out the Harford road to Hall's Springs. This system has 49 miles of track, of which 27 miles will be equipped with electricity, and 22 are already fitted out with cables. This company has laid 75 lb. girder rails, has 300 cars, and uses Allis engines. It has three power houses for cables, and will have an immense electric plant in South Baltimore. The capital stock was originally \$1,000,000, but the company was authorized to issue \$2,000,000 additional stock when rapid transit was introduced, and it has \$2,000,000 in bonds outstanding.

The City & Suburban system has consolidated several of the horse car lines, and has about 45 miles of track. Twenty-five, 45 and 65-pound T and girder rails have been used, and it has an equipment of 200 light running Edison motor and electric cars. This system has an immense electric plant building near the water front on Pratt street which will supply all the circuits of its numerous and extensive lines. Its lines unite with the centre of the city, Towson and Highlandtown, suburbs on the Frederick road, Catonsville, and one of its proposed extensions will reach to Ellicott City. Its capital stock is \$3,000,000, and bonds to the amount of \$1,430,000 have been issued.

The Lake Roland Elevated system has 20½ miles of track, upon which are laid 66 and 74-pound T duplex and girder rails. It has 56 cars of the Edison electric system, and its equipment consists of a generous supply of Lewis & Fowler cars, which run regularly between the centre of the city and Lake Roland, connecting therewith with Roland Park in the suburbs and also Walbrook on West North avenue. The capital stock is \$1,000,000, and \$1,000,000 in bonds have been issued.

The Central Railway is the "cross town system" of Baltimore. It skirts the city from the foot of Broadway along the eastern, northern and western sides to Druid Hill Park. It was the first road in Baltimore to be fitted throughout with electricity. It has 13 miles of track laid with 80-lb. tram rails. Brill and Stephenson cars with Thomson-Houston motors are used on this system, Macintosh & Seymour engines providing power. It has an equipment of 50 cars. The capital stock is \$350,000, and the company has an authorized stock of \$300,000, bonds \$700,000.

The street car companies of Baltimore charge a uniform fare of five cents for each adult passenger within the city limits. One or two of the systems whose lines extend into the country charge an additional fare beyond the city boundaries. One company, the City & Suburban, sells six tickets for 25 cents, and each of the systems transfer passengers at some of the junctions from one part of their lines to another. Transfers between the competing companies exist in only one instance, where the Central Railway and Lake Roland Elevated transfer passengers to one another's lines at the crossing on Preston street. The receipts of the several companies for 1893 are exhibited in the following table:

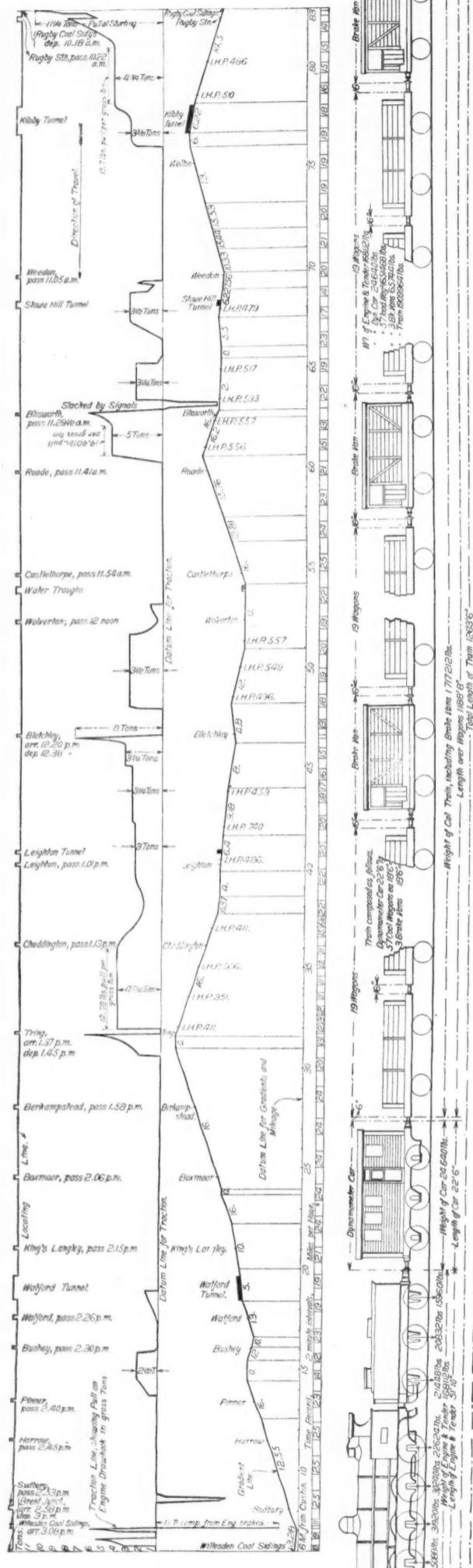
|                      | Miles. | Earnings.      | Park Tax.    |
|----------------------|--------|----------------|--------------|
| Traction Company     | 78     | \$934,404.00   | \$84,095.35  |
| City Passenger R. R. | 49     | 779,241.68     | 50,131.84    |
| City and Suburban    | 45     | 364,744.11     | 32,826.97    |
| Central Railway      | 13     | 208,040.44     | 18,723.64    |
| Lake Roland Elevated | 21     | 121,371.6      | 10,923.45    |
| Totals               | 206    | \$2,407,802.87 | \$216,707.26 |

One of the main features in the contracts between the several street railway corporations and the city is the park tax regulation. Nine per cent. of the gross revenues, due each quarter, is reserved in payment for the franchises and constitutes what is known as the Park Tax Fund, used for the sole purpose of maintaining the several parks and public squares of the city. In addition, the real estate and corporate property of the several companies are taxed like that of individuals. In 1893 the real-estate assessment on all the companies was on the basis of \$2,221,906, and yielded receipts of \$28,789.30; while assessments on stock were on the basis of \$3,547,749 and yielded \$38,143.66. These, with an annual license tax of \$5 upon each car, constitute the items paid to the city and state by the street-car companies.

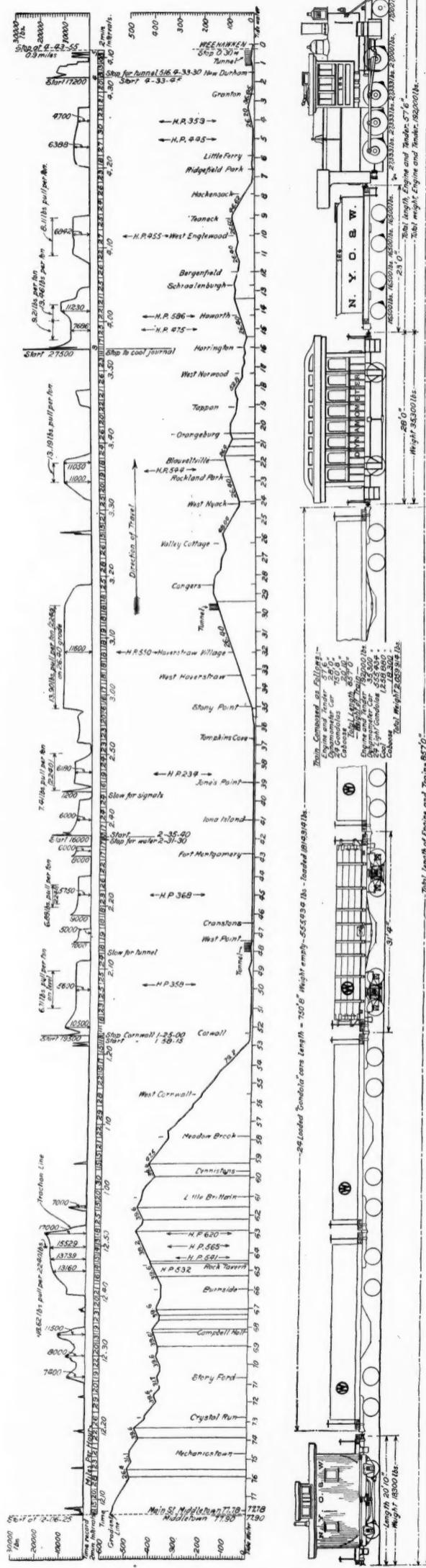
The question of danger is still an unsolved problem in Baltimore. The City Council has passed several ordinances, but it has been impossible to enforce them, and the cars are without fenders and are still a menace to the public. The roll of victims within three years since the introduction of rapid transit has increased almost weekly, and 54 persons have lost their lives by being run over or injured in collision with the cars. It is maintained by the managers that no practical fender has yet been invented.

## English Coal in France and the Railroads.

The returns of the coal production in France for 1893 show the absurdity of the present campaign of the French mine owners against the importation of foreign coal. The output in France last year decreased as compared with 1892, and amounted to less than three-fourths of the home consumption, yet the mine owners would, if possible, exclude foreign coal, at the risk of crippling



## English Train, Profile and Traction Diagram.



American Train, Profile and Traction Diagram.

native industry. The production in 1893 was 25,738,073 tons, against 26,178,701 tons in the previous year, and the imports of foreign coal were 8,771,429 tons. The Government is endeavoring to raise a barrier of protection by a pressure on the great railway companies to reduce their rates below the cost of carriage, and to use French coal only. The principal consumption of English coal is in the country traversed by the Western system of lines, that region not containing any collieries, and being accessible by the Channel and Atlantic ports. In order to enable the great northern collieries of the departments of the Nord and Pas-de-Calais, which yield half the French production, to reach the district now supplied from England, the Minister of Public Works has made a demand upon the Western company to extend the distance over which coal is carried at the lowest fixed rate from 200 to 300 miles. The company demurs, as this would entail an annual loss of nearly £9,000, and as there is no freight from the new regions to be opened the trucks would have to return empty to their point of departure. The loss would fall temporarily on the state, as it would increase the sum the Western company has to demand under the guaranteed interest to complete its dividends, but the company has to pay interest on the advances, and will have some day to reimburse the capital.—*The Economist.*

## Comparative Tests of English and American Railroad Trains.

To Messrs. Joseph Price, Vice-President, and J. E. Childs, General Manager of the New York, Ontario & Western Railway, is due great credit for instigating and conducting a comparative test of English and American trains with a view of determining the relative tractive power of the locomotives, the advantage of the American short trains over the English long wagon-trains, the cost of hauling trains of equal weight and paying load and the comparative value of the two systems in general. The results are given herewith in the accompanying diagrams and tables. The English test was made first on the London & Northwestern Railway between Rugby and Willesden in July. The results of the test were worked up, tabulated and diagramed by the London & Northwestern Railway Company and forwarded to this country to be duplicated as nearly as could be by the New York, Ontario & Western Railway. The N. Y., O. & W. has a division from Middletown to Weehawken of almost exactly the same length as that of the English road, and the trip was made over this division. But while the *length* was the same the other circumstances attendant were quite different. The alignment of the English road was good and the grades low, while the American road abounds in abrupt changes of heavy grades and sharp curves. Table I. gives the data concerning the trip so completely and in such detail that it is unnecessary to repeat it in the text, and reference will be made to it without repeating the figures there contained.

The results of these tests are so extraordinary and so likely to meet criticism that we have taken considerable pains to carefully go over the diagrams, weights and results in anticipation of questions that will be raised. The results have been given in great detail and comparisons made without regard to our own views or criticisms that may be made.

TABLE I

TABLE I.  
COMPARATIVE TESTS OF ENGLISH AND AMERICAN TRAINS.  
English Train—Rugby to Willesden, July 16, 1893.  
American Train—Middleton to Wetherby, August 17, 1893.

| American Train—Middletown to Weehawken, Sept. 17, 1892                          |                | English Train. | Am. Train. |
|---|----------------|----------------|------------|
| Length of trip, train miles   | 77             |                |            |
| Time of trip, including stops   | 4 hrs. 50 min. | 4 hrs. 38 min. |            |
| Time of trip, excluding stops   | 4 hrs. 22 min. | 3 hrs. 59 min. |            |
| Mean speed, including stops   | 15.93 miles    | 16.77 miles    |            |
| Mean speed, excluding stops   | 17.63 miles    | 19.50 miles    |            |
| Maximum speeds  | 25 miles       | 30 miles       |            |
| Grades:   |                |                |            |
| Maximum grades, ratio   | 1 in 330       | 1 in 133       |            |
| Maximum grades, feet per mile   | 16.2           | 39.6           |            |
| Vertical lift of train in feet, about   | 330            | 65             |            |
| Vertical fall of train in feet, about   | 508            | 1,224          |            |
| Vertical lift of entire train in<br>foot-pounds                                 | 630,286,800    | 1,402,801,434  |            |
| Vertical fall of entire train in<br>foot-pounds                                 | 970,259,680    | 2,525,454,562  |            |
| Vertical lift of train exclusive of<br>locomotive                               | 574,809,840    | 1,272,049,434  |            |
| Average lift, per mile of up-grade  | 10.3           | 28             |            |
| Average lift per mile of trip   | 4.3            | 8.3            |            |
| Level track, in miles   | 9.0            | 18.5           |            |
| Miles of up-grade   | 32.20          | 24.0           |            |
| Traction distance in miles  | 40.38          | 41.67          |            |
| Ratio of traction distance to total<br>distance                                 | 1 to 1.91      | 1 to 1.86      |            |
| Number of starts and stops  | 4              | 5              |            |
| Number of times train slowed up   | 1              | 2              |            |
| Traction in mile-pounds   | 426,523        | 461,000        |            |
| Total foot gross tons work regis-<br>tered by dynamometer                       | 768,855        | 857,578        |            |
| Mean tractive power in pounds   | 8,077          | 8,726          |            |
| Average drawbar pull for whole<br>distance, lbs.                                | 4,236          | 4,688          |            |
| Coal consumed on trip, pounds   | 4,172          | 7,196          |            |
| Consumption of coal per mile, lbs.  | 54.2           | 96.6           |            |
| Water evaporated on trip, galls.  | 3,270          | 4,600          |            |
| Water evaporated per pound coal,<br>galls                                       | 0.734          | 0.614          |            |
| Consumption of coal at 51.2 and<br>96.6 lbs. per mile, per ton-mile<br>of train |                |                |            |
| Inc. engine and tender in oz.   | 1.017          | 1.68           |            |
| Exc. engine and tender in oz.   | 1.115          | 1.84           |            |
| Foot-tons tractive work regis-<br>tered per pound of coal                       | 184            | 114            |            |
| Cost of fuel per ton, English Bitu-<br>minous and buckwheat anthra-<br>cite     | \$1.885        | \$0.98         |            |
| Cost of fuel for trip   | 3.51           | 3.28           |            |
| Wages of engine crew for trip   | 2.92           | 4.29           |            |
| Wages of train crew for trip  | 3.65           | 7.30           |            |
| Total ton-miles, including engine<br>and tender                                 | 65,655         | 71,360         |            |
| Total ton-miles, excluding engine<br>and tender                                 | 59,876         | 64,710         |            |
| Total ton-miles, paying load  | 33,953         | 43,611         |            |
| Cost of fuel per train-mile   | 4.56c          | 4.23c          |            |
| Cost of fuel per ton-mile, includ-<br>ing engine and tender                     | 0.0053c        | 0.0045c        |            |
| Cost of fuel per ton-mile of paying<br>load                                     | 0.0103c        | 0.0075c        |            |
| Wages of engine crew per ton-<br>mile paying load                               | 0.0086c        | 0.0093c        |            |
| Wages of train crew per ton-mile<br>paying load                                 | 0.0107c        | 0.0167c        |            |

|   | English Train.        | Am. Train.    |
|---|-----------------------|---------------|
| Cost of wages and fuel per ton-mile of paying load .....      | .02960c               | 0.0333c       |
| Weight of train, pounds:                                      |                       |               |
| Engine, weight on drivers.....                                | 109,872               | 109,000       |
| Engine, weight on truck.....                                  | 0,000                 | 17,000        |
| Tender, weight.....   | 58,240                | 66,000        |
| Engine and tender, total weight .....                         | 168,112               | 192,000       |
| Dynamometer car.....  | 24,610                | 35,300        |
| Three brake vans or caboose.....                              | 65,710                | 18,300        |
| Fifty-seven coal wagons or 24 gondolas.....                   | 663,740               | 555,434       |
| Load in coal wagons or gondolas.....                          | 987,728               | 1,258,880     |
| Total weight of trains, pounds..                              | 1,909,960             | 2,059,914     |
| Total weight of trains, gross tons                            | 852,660               | 919,604       |
| Ratio of weight of engine and tender to train.....            | 1 to 10.36            | 1 to 9.72     |
| Weight of train exclusive of engines, gross tons.....         | 777.6                 | 833.44        |
| Dead load, lbs  | 922,236               | 801,034       |
| Dead load, per cent.....                                      | 48.29                 | 38.89         |
| Paying load, lbs.....   | 987,728               | 1,258,880     |
| Paying load, per cent.....                                    | 51.71                 | 61.11         |
| Engines, length of trains (the lengths are over all),         |                       |               |
| Tenders.....  | 31 ft.                | 34 ft. 6 in.  |
| Dynamometer.....  | 20 ft. 10 in.         | 23 ft.        |
| Brake vans or caboose.....                                    | 22 ft. 6 in.          | 28 ft.        |
| Wagons or gondolas.....                                       | 59 ft. 6 in.          | 20 ft. 10 in. |
|   | 1,129 ft. 8 in.       | 750 ft 8 in.  |
| Total length of trains, feet.....                             | 1,263 <sup>1</sup> /4 | 857           |
| Number of axles in train.....                                 | 130                   | 109           |
| Length of curvature, miles.....                               | ...                   | 23.8          |
| Degrees of curvature, degrees.....                            | ...                   | 3,378         |
| Highest degree of curve.....                                  | ...                   | 7             |
| Load on each journal of wagons or gondolas, net tons.....     | 3.61                  | 4.72          |
| Comparative areas of traction diagram for whole distance..... | 92.00                 | 93.83         |

The length of the English trip is 0.6 mile less than that of the American; the time and the mean speed, both including and excluding stops, are greater. The maximum rising grade of the English road was 16.2 feet per mile, and two of the longest were respectively two miles and six miles, while on the American road there were several short grades 39.6 ft. per mile, one nearly three miles long, and two two mile and one six-mile grade of 26.4 ft. each. The vertical lift of the entire train, including engine and tender, in foot-pounds, is shown in the table, that of the American being about double; while the energy of coasting is about 2.56 times more than that of the English train. The average lift per mile of up grade as figured from the large blueprint profiles furnished is 2.6 times greater for the American road than for the English, and the average lift per mile of entire trip shows a ratio of 2 to 1. The miles of level track, ratios of up-grades, and traction distances as shown by the traction diagram, and the ratio of traction distances to the total distance are to the disadvantage of the American train. The number of stops and the number of times the train was slowed were fewer for the English than for the American train.

While the English train had  $1\frac{1}{2}$  times as many miles of rising grade, the average rising grade per mile for the two roads was as 10.3 to 26.5 American, and the average grade for the whole division was as 4.3 English to 8.5 American; the level track of the English road was but  $\frac{1}{2}$  that of the American.

The vertical distance through which the English train was lifted was less than one-half that of the American, and the vertical fall but 0.42 as much. The brakes were applied upon the down grades so that only a small part of the energy of coasting could be utilized in ascending grades. The maximum speeds recorded were 25 for the English and 30 miles an hour for the American train. On the American train the speeds were registered automatically by the Boyer speed-recorder, and the results registered were carefully checked by the timepieces on the train.

TABLE II.—EQUIVALENT DRAWBAR PULL IN LBS. PER TON  
FOR TRAIN ON LEVEL TRACK AT DIFFERENT PLACES.

Without doubt the short falls and quick rises of the O. & W. road were much better to conserve and utilize the momentum of the American train than were the long continuous grades of the L. & N. W. road. Reference to the diagrams will show that steam was used on nearly all the grades of both roads and the distances through which the diagrams indicate a draw-bar pull are practically the same, being respectively 40.38 and 41.67 miles. It is supposed that both roads took all the advantage that moderate speed would permit to make use of the energy of coasting to ascend grades or run on level.

A careful study of the traction diagram reveals some interesting data. Table II. has been prepared, to show the comparative draw-bar pulls of the two trains at different mile-posts. The last column shows the tractive force per ton (2,000 lbs.) necessary to overcome the resistance of the track, rolling stock and atmosphere after the resistances of grade and acceleration have been deducted from the actual drawbar pull recorded. It will be noted that the resistances of the English train are very uniform and regular and average 6 lbs. per ton, while those of the American trains vary from 1.73 to 5.67 lbs. per net ton. The only explanation of this irregular drawbar pull offered, by those making the tests, is that due to the abrupt changes, steep grades and sharp curves of the American road.

The average pull of 3.51 lbs. per ton may excite some criticism, which is invited. We know that it will be considered low, and that such results as 1.73 and even 2.30 will be taken by many as doubtful if not as incorrect. The Master Car-Builders' brake tests of 1887 gave with new empty cars 5.87 lbs. pull per ton, and in another test for a train of 12 loaded and 13 empty cars on a straight level track, with Westinghouse brakes, it gives 4.32 lbs. pull per ton. A train of old cars all loaded and in motion might be expected to require considerably less tractive force. The results obtained in the M. C. B. tests of 1887 also may have included the high resistance of the engine and tender.

Resistances have been recorded by the Pennsylvania Railroad Company's dynamometer car as low as 1.6, 2.0 and 2.26 lbs. draw-bar pull per net ton on straight level track at low speeds. The average of a large number of results obtained by measuring the minimum grade upon which a loaded freight car would maintain itself in motion at slow speeds gave a resistance for the journals, track, etc., of 2.81 lbs. per ton. These results are exceptional, but are nevertheless of record, and if accepted the results of the American train tests will leave some thing for the atmospheric and curve resistance.

M. Edouard Sauvage, in his recent publication, "La Machine Locomotive," says that the total resistance of trains is estimated very differently in different places, at from 6 lbs. per net ton for a speed of 12 miles an hour to 10 lbs. for a speed of 24 miles an hour, and that for equal weights the longer trains have the greater resistance. This may include the resistance of the locomotive. A strong wind upon the side of a train increases the resistance greatly, augmenting the wheel flange and journal resistance, in addition to the resistance of the atmosphere.

Great pains was taken by the officials of the O. & W. road to make the tests reliable, and they have the greatest confidence in them. The loaded cars were all weighed at Middletown before starting, and the net weights of the coal were checked when the coal was received at Weehawken.

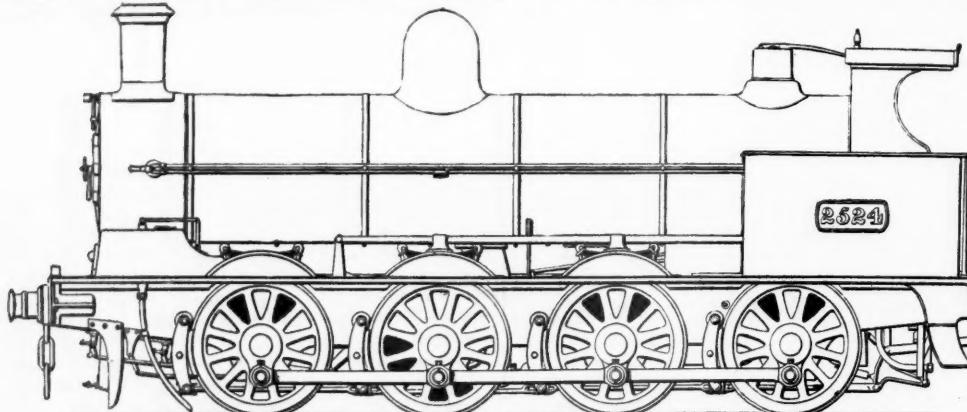
It is contended that the explanation of these figures is to be found in the original motive of the test, which was to prove not so much the superiority of the American over the English locomotive as to prove the superiority of the American train as a whole; the American car versus the English wagon; to prove that the shorter train, with its fewer axles and journals, makes the better and more economical train; that the American train, being short, with larger journals, suffers less resistance from wheels and track. Fifteen or 20 years ago the English trains showed a great advantage in the ratio of dead loads to the live loads. Then the Americans were hauling a 10-ton car to carry 10 tons of freight; now they have 12-ton cars carrying 30 tons of freight, while the Englishmen are using nearly the same wagons as did their forefathers.

The results obtained surpassed the expectations of those who undertook the tests. A general comparison of the diagram shows the American locomotive hauling a slightly heavier train at a higher speed on a 26.4 grade with 13.90 lbs. pull per gross ton, while the English locomotive exerted a pull of 13.7, 14.4 and 12.78 lbs. per gross ton on 16.2 ft. (or less) grades at successive points of the line. A more careful comparison of the average results of Table II. shows a ratio of 6 lbs. to 3.51 lbs., or 1 to .58, a comparative result which was hardly expected. The results at first gave rise to some fears that there was a mistake in the profile, or the speeds, or the weights or the dynamometer car, but careful inquiry has been made as to all these points, and the greatest care seems to have been taken in them all. A careful investigation reveals no just reasons for doubting the results so far as the means employed, the care exercised and the conscientious efforts of all concerned to arrive at an accurate and honest result.

The coal consumption of the American locomotive was 8 times that by the English locomotive, while the

water evaporated was as 1:1.4, and the total tractive work as 1:1.12. These are what might be reasonably expected. The inferior coal used in the American locomotive would generate less steam than the better grade used by the English engine, and the fact that the American locomotive was kept at the point of blowing off throughout the trip would explain the loss in steam. However much criticism the dynamometer results may provoke as regards the tractive power, there is no getting around the fact that the American train, which, as

| LOCOMOTIVES.—ENGLISH AND AMERICAN TRAIN TESTS.                                  |                                |
|---|--------------------------------|
| <i>English Locomotive.</i>  |                                |
| Type .....  | Mogul freight                  |
| Name or number .....  | 2524, coupled goods engine     |
| Name of builder .....   | London & Northwestern Ry.      |
| Name of operating road .....  | London & Northwestern Ry.      |
| Gage .....  | 4 ft. $\frac{5}{8}$ in.        |
| Simple or compound .....  | Simple.                        |
| Kind of fuel to be used .....   | Bituminous coal                |
| Weight on drivers .....   | 109,572 lbs.                   |
| " truck wheels .....  | 0,000 lbs.                     |
| " total .....   | 109,572 lbs.                   |
| Wheel base, total, of engine .....  | 17 ft. 3 in.                   |
| " driving .....   | 5 ft. 9 in.                    |
|   |                                |
| Boiler, type of .....   | Straight top                   |
| " working steam pressure .....  | 180 lbs.                       |
| " material in barrel .....  | Steel                          |
| " thickness of material in barrel .....   | 0.5 in.                        |
| " diameter of barrel .....  | 60 in.                         |
| Seams, kind of horizonal .....  | double riveted with welt strip |
| " circumferential .....   | Lap, double riveted            |
| Thickness of tube sheets .....  | $\frac{1}{8}$ in.              |
| " crown sheet .....   | $\frac{3}{8}$ in.              |
| Crown sheet stayed with .....   | Radial staybolts               |
| Dome, diameter .....  | 28 in.                         |
| Tubes, number (set with copper ferrules) .....                                  | 248                            |
| " material .....  | Wrought iron                   |
| " outside diameter .....  | 2 in.                          |
| " length over sheets .....  | 11 ft. 4 "                     |
| Firebox, length .....   | 10 ft.                         |
| " width .....   | 8 "                            |
| " depth front, crown sheet to mud ring .....                                    | 46 in.                         |
| " back .....  | 46 "                           |
| " material .....  | Otis plate steel               |
| " thickness of sheets .....   |                                |
| Side and back $\frac{1}{8}$ ; crown, $\frac{3}{8}$ in.; tube, $\frac{1}{8}$ in. |                                |
| " brick arch? No .....  |                                |
| " water space, width .....  |                                |
| Front, 4 in.; sides, 3 in.; back, $3\frac{1}{2}$ in.                            |                                |
| Grate bars, wrought iron tubes with cast iron intermediates .....               |                                |
| Smokebox, diameter, extension pattern .....                                     | 64 $\frac{1}{4}$ in.           |
| " length .....  | 50 "                           |
| Exhaust nozzle, single or double .....  | Double                         |
| " variable or permanent .....   | Permanent                      |
| " diameter .....  | 34 in.                         |
| " distance of tip above or below center of                                      |                                |
| boiler .....  | Top of tip 3 in. above         |
| Netting, wire or plate .....  | Wire netting                   |
| " size of mesh or perforation .....   | No. 2 $\frac{1}{2}$ in.        |
| Stack, straight .....   | Straight                       |
| " diameter .....  | 18 in.                         |
| " height above smokebox .....   | 4 ft. 4 in.                    |
| Tender .....  |                                |
| Tank capacity, gallons .....  | 3,600                          |
| Diam. of wheels .....   | 33 in.                         |



English and American Train Tests—London & North Western Locomotive

far as weight and load are concerned, was a counterpart of the English train, was hauled over an equal distance, at a higher rate of speed, through twice the vertical rise, over greater curvature, by an engine of about the same estimated capacity, and 20 lbs. more of steam pressure. A comparison of the locomotives may be made from the general descriptions given, and the engravings.

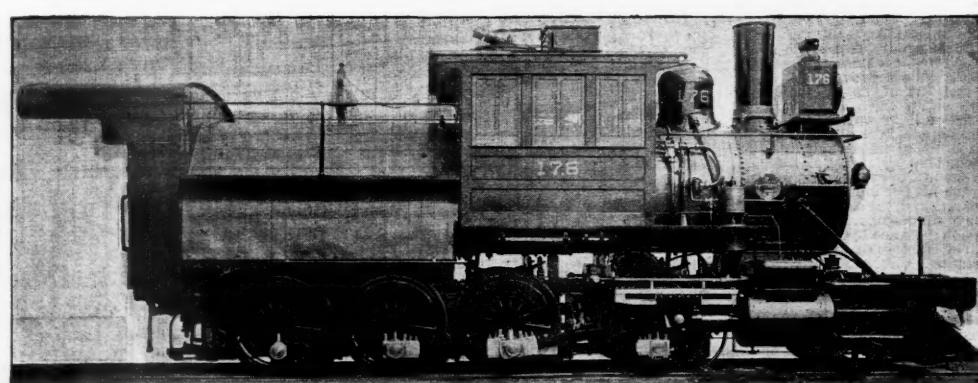
If there be doubt as to the results, it will not be much trouble to repeat the tests under nearly the same circumstances and conditions. It is unfortunate that the alignment and conditions of track are not better known, and also the direction of wind and any other atmospheric conditions that prevailed. While the curvature of the L. & N. W. is not known absolutely, it may be reasonably taken for granted that the curves upon the English road probably did not exceed 3 degs., and that there were few of them.

An important question, of course, to be considered in such a test is that of economy, and this is answered in Table I. First it shows that the amount of coal consumed was nearly double on the American locomotive what it was on the English. The water evaporated per pound of coal was greater by the English locomotive, in consequence, doubtless, of their having used a much better quality of coal. The English locomotive burned a superior quality of bituminous coal, while the American locomotive burned a cheap quality of buckwheat anthracite coal, whose only cost is that of screening, loading and hauling, it being taken from the enormous culm piles of the coal regions. Its cost, as compared with the English coal, is given in the table, and the fuel cost per trip is slightly less, being \$3.51 for the English and \$3.28 for the American locomotive. The train wages for the trip are double on the American train what they are on the English train, but the cost of fuel per ton-mile of *paying* load is considerably less on the American than on the English train. Also it should be noted that the total ton-mileage, including the engine and tender, is greater for the American train, and considerably greater when expressed in terms of paying load.

The weights of the trains are given in the table and need no comment except to call attention to the fact that the weight upon the locomotive drivers was very nearly the same. The total weight of the American locomotive is the greater, but the excess is on the forward truck and in the tender, where it did not add to the tractive power of the locomotive. The total weights of the train are given exclusive of the locomotive, the American train being considerably the heavier and the ratio of the locomotive weight to that of the train slightly less, but the ratio of the weight upon the driving wheels to the total weight of the train, exclusive of the locomotive, is considerably greater. The dead load which includes the cars, brake vans, etc., is greater for the English train, but the paying load—*i. e.*, the load of merchandise, coal in this instance—is in the ratio of 1 to 1.37. The table gives the paying load per cent.

A very interesting feature of the comparison is shown by the comparative areas of the traction diagrams for the whole distance figured in square inches from each large blueprint diagram and then reduced to uniform scale. It shows the traction of the English train nearly the same as that of the American train as well as the traction in mile-pounds and the mean tractive power for the whole distance. The mean tractive powers were determined by dividing the total area of the traction diagram by the distance over which the drawbar, between the engine and train, was in tension, the area being taken in mile-pounds instead of square inches. The areas must of necessity be approximate, being figured from a drawing at so small a scale. The foot tons of work registered were figured from the original traction diagrams.

|  |                              |
|--|------------------------------|
| Length over all, engine.....                                     | .31 ft. 00 in.               |
| "      total, engine and tender.....                             | .51 ft. 10 in.               |
| Height, center of boiler above rails.....                        | 7 ft. 10 $\frac{1}{2}$ in.   |
| "      of stack.....   | 13 ft. 1 $\frac{1}{4}$ in.   |
| Heating surface, combustion chamber 39.1; firebox, 114.7 sq. ft. |                              |
| "      tubes.....  | 408.5 + 650.5 sq. ft.        |
| "      total.....  | 1,213.3 sq. ft.              |
| Grate area.....  | 20.5 sq. ft.                 |
| Drivers, number.....   |                              |
| "      diameter.....   | 53.5 in.                     |
| Journals, driving axle, size.....                                | 7 in.                        |
| Main crank pin, inside, size.....                                | 8 in.                        |
| Cylinders, diameter.....   | 19.5 in.                     |
| Piston, stroke.....  | 21.0 in.                     |
| "      rod, diameter.....  | 3.5 in.                      |
| Main rod, length center to center.....                           | 4 ft. 3 $\frac{1}{2}$ in.    |
| Steam ports, length.....   | 14 in.                       |
| "      width.....  | 2 in.                        |
| Exhaust ports, length.....                                       | 14 in.                       |
| "      width.....  | 4 $\frac{1}{2}$ in.          |
| Valves, kind of.....   | Joy's valve gear.            |
| "      greatest travel.....                                      | .5 in.                       |
| "      outside lap.....  | 1 in.                        |
| "      lead in full gear.....                                    |                              |
| Boiler, working steam pressure.....                              | 144 lb.                      |
| "      diameter of barrel.....                                   | 160 lb.                      |
| Seams, kind of, horizontal; length of barrel.....                | 15 ft. 6 in.                 |
| Dome, diameter.....  | 30 in.                       |
| Tubes, number.....   | 1500.                        |
| "      outside diameter.....                                     | 2 $\frac{1}{4}$ in.          |
| "      length over sheets.....                                   | 4 ft. 10 in. and 8 ft. 1 in. |
| Firebox, length.....   | 6 ft. 10 in.                 |
| Stack, height above smokebox.....                                | 2 ft. 10 in.                 |



## English and American Train Tests—N. Y., O. & W. Locomotive

|  |                                  |
|--|----------------------------------|
| Heating surface, firebox.  | 147 sq. ft.                      |
| "    tubes.  | 1,482 sq. ft.                    |
| "    total.  | 1,629 sq. ft.                    |
| Grate area.  | 80 sq. ft.                       |
| Drivers, number.   |                                  |
| diameter.  | 50 in.                           |
| "    material of centers.  | 44 in. cast iron                 |
| Truck wheels, diameter.  | 35 in., steel tired              |
| Journal's, driving axle, size.   | 10 in. long by 8 in. dia.        |
| "    truck   | 10 in. long $\times$ 5 in. diam. |
| Main crank pin, size (main rod bearing, 6 in. long $\times$ 5 $\frac{1}{2}$ in.) |                                  |
| "    side  | 4 in. $\times$ $\frac{5}{8}$ in. |
| Cylinders, diameter.   | 20 in.                           |
| Piston, stroke.  | 24 in.                           |
| "    rod, diameter.  | 3/4 in.                          |
| Kind of piston rod packing.  | Excelsior metallic               |
| Main rod, length center to center.   | 6 ft 6 in.                       |
| Steam ports, length.   | 16 in.                           |
| "    width.  | 16 in.                           |
| Exhaust ports, length.   | 16 in.                           |
| "    width.  | 3 in.                            |
| Bridge, width.   | 196 in.                          |
| Valves, kind of.   | Richardson's balance pattern     |
| "    greatest travel.  | 5 $\frac{1}{2}$ in.              |
| "    outside lap.  | 5 $\frac{1}{2}$ in.              |
| "    inside lap.   | Lap, $\frac{1}{2}$ in.           |
| "    lead in full gear.  | Variable                         |
| "    constant or variable.   | Variable                         |

their help, as there was a time when the directors felt timid, but their engineers gave them confidence, and from what they said he felt sure that when the line was completed they would be able to pay a five per cent. dividend.

Sir DOUGLAS FOX : The problem was now solved, but it was mainly, he thought, through those at the head of affairs being keen men of business, and knowing what was wanted, and communicating this to their engineers. It was true that the line was short, but the experience of it was intricate in the extreme, for the railway threaded its way among roads, warehouses, under railways, over dock entrances, and besides this they had the Liverpool authorities to deal with.

As there was a large yard available at the north end of the line, the delivery of all materials had taken place there, and although at first sight it might appear that this was an expensive way of working, experience has decidedly proved the reverse. The directors required them to build an economical and durable structure, and above all things fireproof, for they were running in the midst of an inflammable neighborhood, and there had been several fires near the line, but no damage had been done to the structure. They were also like most

engineers tied for head room, and they were obliged to introduce under bracing. His colleague and himself had had many consultations as to the best design for a structure of this height, and they came to the conclusion that a girder of 50-ft. span should be the normal one, but such were the difficulties of the road that only one-third of the spans were normal, and two-thirds abnormal; they thought they might have used a normal span, but had to go to the abnormal. The railway had cost £90,000 per mile, and £100,000 had been spent in sloping bridges, diverting lines and repaving the roads underneath. With regard to the platform on which the trains ran, they had to make up their minds to have one which was practically noiseless, easy to paint, stiff, and tending to help in the cross bracing. After a great deal of consideration they had finally agreed to use Hobson's system, and this had given great satisfaction, the tests being remarkable. One other point they had to consider was that in railway running among the streets it required to be "drop-dry," and the meeting would appreciate the sorrows which fell on them, but he was glad to say they had been very successful. He might tell them that it was necessary when using asphalt not to put any sand in it, for the work was then not reliable. The whole structure had given wonderful stiffness, and was much quieter than had been anticipated. Referring to the foundations of the piers, they had no less than 1,200 of these, and if they had been at all luxurious they would quickly have heard of it, so they adopted concrete, fixing the holding-down bolts into it and bolting securely to the columns, also putting in cast iron bases which prevented damage from wagons. Mr. Huddlestone had told him only a week ago that during the whole year there had been no settlement, thus showing that they had not overloaded the foundation. He thought that they might fairly claim that the whole structure at £90,000 per mile was not extravagant for a double line.

With regard to the parapet, they were compelled to adopt something of this sort, and running from end to end, so as to enable passengers to walk from the cars to the stations, which were fairly close together, should the motive power fail them at any time. The Board of Trade would have compelled them, he thought, to take some such measures. He would also point out the way this parapet was made, and the use they had found for it to pass compressed air through some of the tubes, and although it was cheap it did not rattle in any way. He would like at the next meeting to give the tests of the platforms.

One thing he felt sure was, that they must have plenty of stations on the railway, as the public would soon desert them if they had to walk far, and they, therefore, had no less than 13 stations on the line that was open, and intended to have 16 when the whole line was completed. The most important item, he thought, was the small amount spent on each station. They were double and strong, and averaged complete £2,500 each.

He drew attention to the swing bridge at Stanley Dock, as it was really a two-road bridge, and beside being a swing bridge, it was a bascule one as well, to enable barges with masts being taken out without swinging the bridge. There were several other bridges to allow for boilers, etc., passing under the railway, and they were made in tilt form, and were found to answer very well. The cost of them was small, but they were handy. The meeting then adjourned.

#### MEETING OF MARCH 6—DISCUSSION RESUMED.

**Sir DOUGLAS FOX:** The tests of the Board of Trade inspection, which occupied four days over the 600 spans, were as follows: Four fully-loaded trains were used, equal to 13 cwt. per foot of way, on the 40-ft. spans the deflection was  $\frac{1}{2}$  in., on the 75-ft. spans  $\frac{1}{2}$  in., and on the Stanley Bridge, where the weight was increased by four Lancashire & Yorkshire engines, equal to 30 cwt. per foot of way, together with the load overhead of the four fully-weighted trains, making in all 4 tons per foot of way, the deflection was only  $\frac{1}{2}$  in.

When dealing with the question of hauling power, the great difficulty they had to contend with was that the Dock Board would not permit the use of locomotives within their walls, as the sparks were considered to be dangerous, and so stringent were their regulations that they would on no account permit smoking within the premises of the board, therefore any hope of using steam traction was at once abolished. With regard to the use of cables, they had no gradients, except at the place where the line dipped under the L. & Y. Railway, and there was the fact that the cable was always running, which added very much to the expense of up-keep; besides, they could not attain the speed they required. Their conclusions came rapidly to the use of electricity, and they were now more than satisfied with the results which had so justified the selection. To make electricity pay they must have short trains at short intervals, and he thought this suggestion might be adopted on the metropolitan lines with success.

The cost had been stated to be £91,000 per mile, and it was made up in round numbers of the following items: General works, which included all the superstructure, bridges, &c., £59,000; stations and their equipment, £4,000; plant, which included the generator station complete, £7,700; rolling stock, £5,000; accommodation works, such as diverting and altering the roads below the railway, &c., £13,800; and the Acts of Parliament, inspection, &c., £4,400. He concluded by expressing the view that this railway would be the forerunner of many, that trains of 200 tons as against 40 tons would be running in the near future, and that all that had been accomplished at Liverpool tended towards this result.

**Mr. HEDGES:** He could speak from experience with regard to Canada, which had some 300 miles of electric railway, he referred to the electric railway on the Canadian side of the Niagara Falls, which was  $11\frac{1}{2}$  miles long, and which ran from Chippewa to Queenston, and which was fairly level until it came just outside Queenston, where the gradient was 1 in 21. He was told that in some places it was 1 in 19; there was no difficulty in getting the cars up. They used motor cars having two motors on each car, and sometimes they added train cars to supply the needs of the traffic. He might say that, after all that had been said and written with regard to the proposals by the United States to utilize the falls for motive power, Canada had successfully applied this force to run the railway he mentioned. The turbines were placed 60 ft. down in the solid rock, and all the discharges were made into the falls, so that there was nothing to disfigure the scenery.

The cost of producing the power in the United States did not compare with that at Liverpool. M. R. Guillame had informed him that at Kansas City, where the railway was like the Liverpool one, and 20 miles long, that the cost was 12.9 cents, or  $6\frac{1}{2}$  d., per train-mile. At Denver, where the cars run by cables, the cost was 14 cents, or 7d., per train-mile.

**Mr. W. H. PREECE:** Nearly all the lines in America

were worked with the overhead wire and trolley system, a system which, he thought, disfigured the look of the cities very much indeed, and quite spoilt them to his way of thinking. He thought that it was possible to use underground. One feature in the United States was the mistake of commencing with too light a rail. He heard that 30 to 39-lb. rails were originally employed. Now 60-lb. and even 70-lb. to 90-lb. were commonly used.

He did find one fault with the Liverpool plant, and that was the return to rope driving. In the United States all modern plants work the dynamos direct, and with very few exceptions this was the practice in that country. That was the only flaw he could find with the whole plant, which, taken as a whole, was much in advance of anything in the United States.

He had said that if a full and constant load could be maintained, if the current were produced for electric lighting it would be equal to gas at 2d. per 1,000 cu. ft. Now at Liverpool they only employed the current for 12 out of the 24 hours, and the paper stated that the cost was 4d. per train-mile; this shows a cost of production of eight-tenths of a penny per mile, which was equal to gas at 5d. per 1,000 cu. ft., the energy for the train being applied as electric lighting experiments, which shows his figures to be nearly true. The greatest economy would be with a full and constant load. Mr. Parker had said that they lost only two or three amperes in leakage of the mains from the generating station. He might say there were some very interested people in Liverpool who might find great trouble from this leakage, notably the Postmaster-General, whose wires ran in every direction, and that if the leakage were to increase to 200 amperes then there would most likely be trouble not only from the Postmaster-General, but also from the gas and water companies. It was this leakage that in America compelled the use of the overhead cables.

He had studied the paper very closely, and he noted the objection the Dock Board took to sparks from locomotive engines. Well, what about the sparks from the conductors—would they not be as dangerous? With regard to the cost of the application of electricity to the overhead railways in New York, this was a clear case, and showed how easy it was for an engineer to make his estimate so as to spoil a plan when it met with the approval of his superiors. It was said that £711,000 was required to equip a line equal in length to that at Liverpool, which cost £450,000—or 95 per cent. in excess of that at Liverpool—and that the cost of running was estimated at 4s. per train-mile, as against 4d. in this country.

**Mr. ALEXANDER SIEMENS** said that the question of the economy of the motor cars as against electric motors was one which had to be settled, in his opinion, with regard to each particular case, but he thought that, using only two motors on each car, and two cars only, there was no complication, but when more cars had to be employed, then trouble would arise with the switching. Reference had been made in the tables to the electric motors of the City & South London Railway. The engines thus referred to would draw two more carriages than at present in use, but which could not be adopted owing to want of accommodation in the city. These engines weighed 13.5 tons, which of course altered the figures very considerably.

He thought that the loss of energy which took place at the starting of the train might be lessened in this way: to have a motor generator and to supply a current of 2,000 volts, put the generator at low volts and work the motors on the axles. The cost would not be any more expensive than to supply the loco-motor with 500 volts direct, but this latter system is preferable, as it was simpler.

He would reassure the Dock Board as to the sparks from the conductors, which were only particles of iron and which would never cause fire as their heat was gone almost instantly. He further thought that 88 percent. efficiency for rope driving was too high. Mr. Parker did not do himself justice with regard to his figures of 12.3 miles of the Liverpool line as against 12.9 miles of the City & South London line, the watts per train-mile for about the same weight being 32,650 in the former as against 21,000 in the latter. He felt sure there must be some mistake, as the motors at Liverpool were surely as efficient as those in London. The quick service of trains was the most desirable, and it was imperative to have a constant service to produce the best results.

**Mr. BLACKWELL** spoke as to the visible conductors as against the underground ones, and said that the latter cost £7,000 per mile, while the former only £700 per mile, and in every case had the latter been financial success; this was the reason why the overhead wire and trolley system was almost invariably adopted in the States, and at the present time over thirty millions of money was applied in electric traction there, and there was entire satisfaction and success as to the working.

The meeting was adjourned until 13th inst. for the conclusion of the discussion and reply.

#### The Mason Quick-Release Valve for Air-Brakes.

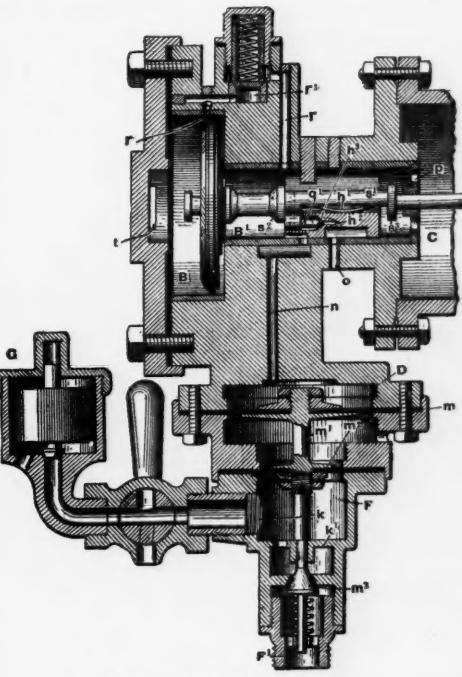
It is not as necessary that the time required to release air-brakes, after a service or emergency application, should be the fewest possible number of seconds, as it is that the brakes should apply as nearly simultaneously as possible with the movement of the engineer's valve, nevertheless it is not only desirable but also essential that the brakes release with certainty and in such time that none of the brakes will be applied when the train is started. A quick release is more imperative in elevated railroad service or in suburban service, in either of which it frequently happens that the signal to start is given as soon as the train is brought to a stop, and in actual service it is found that sometimes, when the conductor knows there is no passenger to get on or off, he gives the starting signal before the train stops; then if the engineer opens the throttle at once, the engine works against the set brakes for an instant. In quick elevated railroad service in which the distance between stations is comparatively short, and the average speed between terminals is from 12 to 15 miles an hour, the satisfactory carrying out of the schedule requires that every second possible be saved in starting trains.

In such service slow releasing triples would not be considered. As such trains increase in weight the demands on the motive power are greater, and the more imperative it is to be able to start instantly from stations. In heavy through trains the heaviest cars are

generally at the rear, the brakes on them are the last to release and frequently release after the train has started. It is probable that the need of a quick-release valve is a growing one and that it will be more in demand as more of the freight equipment is provided with air-brakes. With long freight trains, many of the cars of which are equipped with air-brakes, it is found that delays are often caused by the necessity of bleeding the auxiliaries before starts can be made. These delays will increase as the number of air-brake cars in the trains increase. The object of the valve herein described is to obviate entirely such delays.

The illustration shows a quick-release valve, patented by Mr. H. R. Mason, of the Mason Air Brake & Signal Company; after passing through several stages of development, the device has assumed its present form, shown in the cut. This quick-release valve does not take the place of the ordinary triple, but is an extra attachment to the present usual equipment. It can be fitted to any design of brake now in use.

The cut shows the valve in its normal position, with brakes released. Connection is made at  $F^1$  with the air end of the brake cylinder and with the train pipe through port  $t$ . The train-pipe pressure is communicated to chambers  $B^1$  and  $C$  through the port  $r$ ; the light spring and valve in this port are not essential, a port smaller in diameter would prevent the reduction of pressure in  $B^1$   $C$  before the piston had time to act. Chamber  $C$  is merely to give volume to chamber  $B^1$ . In the normal position also, train-pipe pressure is acting on the diaphragm  $m$ , the chamber above the diaphragm being in communication with chamber  $B^1$  through the port  $n$ . The pressure on this diaphragm keeps the valve  $m^3$  from its seat and



Mason Quick-Release Valve.

there is free communication between the air end of the brake cylinder and the atmosphere through passages  $F^1$  and  $k$ . If a pressure-retaining valve is used, it is attached as shown at  $G$ .

If a reduction is made in the train-pipe pressure, the greater pressure in  $B^1$  and  $C$  will push the piston to its extreme left position, taking with the slide valve which is operated by the stops on the valve stem, closing communication between the chambers and the train pipe; the slide valve closes communication between these chambers and the one above the diaphragm, and opens communication between this latter and the atmosphere through passages  $N$  and  $O$  and the port in the slide valve. The result of this is to seat the valve  $m^3$ , and so close communication between the brake cylinder and the atmosphere. By means of the loose side valve operated by the stops on the stem of the piston valve, together with the small port  $h^2$  in the slide valve, the pressure in chambers  $B^1$  and  $C$  is equalized with the train-pipe pressure, so that an increase in train-pipe pressure of 4 or 5 lbs. following a slight decrease in pressure in the train pipe, or following a reduction sufficient to give the severest application of the brakes, will operate this valve at once and open communication from the brake cylinder to the atmosphere and release the brakes very quickly. Trials on a 50-car train equipment show that the brakes may be released by this valve in  $2\frac{1}{2}$  seconds from the time the engineer's valve is turned to release position. It will be observed that the action of this valve is not confined to letting the air escape from the brake cylinder, but it also allows the air to escape from the auxiliary reservoir until the triple valve acts to close communication between the reservoir and the brake cylinder.

One of the advantages claimed for the quick release valve is that a smaller pump may be used, since the brakes are released by a slight increase of pressure in the train pipe.

**The Ninety-Third Street Subway Under the Illinois Central Railroad Tracks.**

The subway recently constructed at Ninety-third street under the tracks of the Illinois Central Railway Company for the use of the Calumet Electric Street Railway Company is a good example of recent construction in plate girders and shallow floors for short bridge spans. The building of the subway was brought about

during construction was therefore put up in sections, the lateral timbers being only of sufficient length to span one track, and being spliced to the sections adjoining after erection. The erection of the permanent work was similarly handled, so that not more than two tracks were closed at one time, and those for not over three days at a time. With but one track up at a time the necessary changes could be made in about 36 hours.

upon which are laid the tracks of the street railroad company. As the tracks of the street railroad at this point are near the level of the lake, it was deemed necessary to make the roadway as nearly watertight as possible. The subway drains into a catch basin, from which the water is pumped when necessary by a small pump in the power station a few hundred feet away. The street is paved, and has a plank walk on one side six feet in width. The grade of the approaches is 1 in 25.

Fig. 3 represents the elevation of the abutments and the position of the track and girders as finally laid. It will be noticed that the positions of the tracks with relation to the girders vary considerably. This was brought about by the unequal spacing of the tracks as originally laid. The distance of 13.91 ft. from center to center of girders as adopted was such as to necessitate but a slight shifting of one or two tracks in order to gain the requisite clearance, and to simplify the superstructure.

The Illinois Central tracks at this point are at an angle of 79 deg. and 10 min. with the street crossings, and the bridge is therefore on a slight skew. The girders are all alike, 40½ in. in depth over the angle flanges and 30 ft. 6 in. long with two cover plates on top and bottom, as shown in detail in fig. 7. The girders are braced laterally at each end by the latticed strut shown in fig. 4, and at three immediate points by the gusset braces shown in fig. 5, which are riveted at the bottom to the trough sections, forming the bridge floor. The form of the trough sections and the connections with one another and to the latticed strut shown in fig. 6 and in figs. 9 and 10.

An interesting feature is that shown in fig. 8 representing a section of the rail and its fastenings. At equal distances each side of the rail are 8-in. deck beams riveted to the flooring of the bridge, the inside distance between the bulbs being 8 in. Between the deck beam stringers is laid a wooden stringer 3½ x 8 in. in section, the bottom being so formed as to rest both on the flanges of the deck beams and upon the bridge floor. The rail is clamped to this stringer every 16 in. by means of the clamps and bolts shown, and between the washer and the flanges of the deck beams are placed wooden insulators ½ in. in section. The rail is by this means insulated from the bridge structure, a precaution necessary for the use of the Hall block signals operated on the track-circuit system. This detail is further illustrated in figs. 9 and 10. The deck-beam stringers by this construction serve to stiffen the bridge floor and greatly lessen the undulatory movement that can usually be observed from beneath on bridges with shallow floors during the passage of a heavy engine. The deck beams also serve the purpose of guard rails, the inner ones being bent slightly away from the rail at their ends.

No ballast covering of any sort is used on these bridge spans, but all parts of the flooring are left open so far as possible in order to facilitate cleaning and painting. A ½-in. hole is provided at each end of the trough sections for drainage.

The cost of the work was as follows:

|   |          |
|---|----------|
| Earthwork   | \$5,198  |
| Masonry and abutments                               | 16,881   |
| Retaining walls for approaches                      | 4,740    |
| Filling and puddling behind retaining walls         | 1,500    |
| Catch basins  | 220      |
| Paving subway and approaches                        | 2,200    |
| Sundries  | 250      |
| Superstructure work, 283 lbs. of steel and iron     | 9,310    |
| Temporary bridge                                    | 1,975    |
| Trackwork and grading                               | 500      |
| Inspection of work, including City Inspector's fees | 590      |
| Total   | \$43,364 |

The designs of the subway are due to Mr. J. F. Wallace, Chief Engineer, and Mr. H. W. Parkhurst, Engineer of Bridges, of the Illinois Central R. R., to whom we are indebted for the drawings and information furnished. The ironwork was furnished by the American Bridge Works, of Chicago.

**Record of Pneumatic Signals.**

Last week we published the records of operation of Hall automatic block signals on the Illinois Central and on the Kansas City, Fort Scott & Memphis. We now give a similar report from the Pennsylvania Railroad showing the behavior of Westinghouse automatic pneumatic block signals between Pittsburgh and Stewart, Pa., 17 miles, for the year 1893. There are four main tracks on this part of the road and some of these signals have been in use for ten years.

**AUTOMATIC BLOCK SIGNALS, PITTSBURGH DIVISION,  
P. R. R., YEAR 1893.**

*Between Pittsburgh and East Liberty.*—Home signals, 32; distant signals, 22; danger signals displayed from following causes:

|   |    |
|---|----|
| Broken rails  | 3  |
| Loose or broken track wires or renewal of rails                   | 5  |
| Rain or bad track   | 11 |
| Broken battery jars   | 2  |
| Spikes driven so as to touch switch and stock rail                | 1  |
| Broken wire battery to signal                                     | 1  |
| Loose spring in rotary switch box                                 | 1  |
| Trackmen applying track wire from open switch point to stock rail | 1  |
| Unexplained   | 1  |

Total danger signals displayed..... 26  
Total danger signals chargeable to failure of apparatus..... 16

The estimated total movement of signals per year is: Home signals, 1,154,130; distant signals, 966,250; so that the percentage of failures (chargeable to apparatus) to

Subway Under the Illinois Central Tracks—Ninety-third Street, Chicago.

by the necessity of providing for the street railroad a safer crossing than that at grade at Ninety-fifth street. The railroad company has at this point eight tracks, two being devoted to suburban service, two to passenger and four to freight service. The total number of trains passing this point daily is very large, and includes those of the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis as well as those of the Illinois Central. On account of the heavy traffic during the early spring and winter of 1893, at which time a large part of the work was done, it was necessary that the subway be constructed in such a manner as to interfere as little as possible with the movement of trains. The temporary trestle over which the trains were run

Fig. 1 shows the temporary and permanent structure in a cross-section through the subway at right angles to the street, and the spacing of the piles of the trestle parallel with the tracks. The spacing of the piles in the opposite direction is shown in fig. 2. The piles, as shown in the drawing, are about 28 ft. long and are capped by 12 x 14 in. timbers upon which are laid the track stringers, which are 8 by 16 in. in section, four under each track, laid as shown in fig. 2, with cast-iron separators between adjacent timbers.

The abutments are of masonry laid on concrete foundations two ft. in depth. Between the abutments is a bed of Portland cement concrete 30 in. in depth laid upon a bed of puddled clay, and above this the ballast

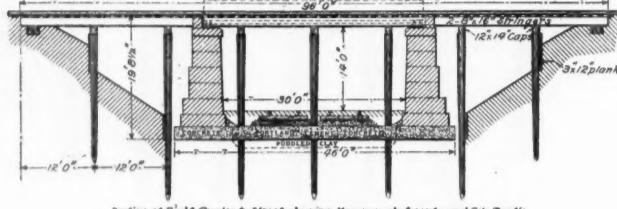


Fig. 1—Cross Section of Street.

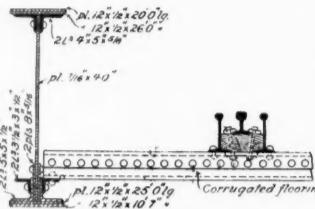


Fig. 10.

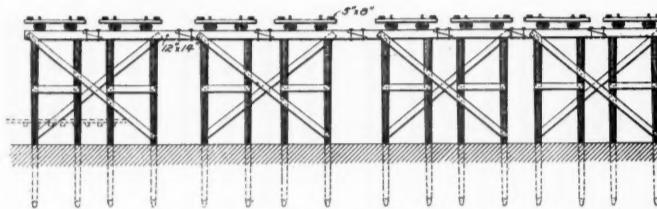


Fig. 2—Cross-Section of Railroad.

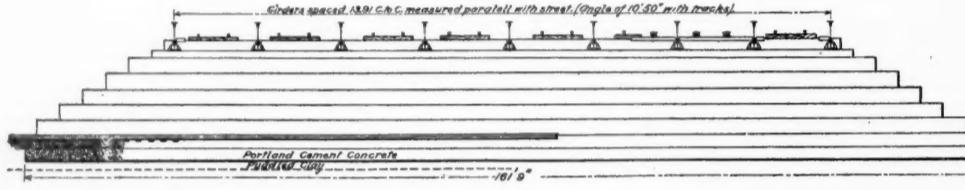


Fig. 3—The Abutment.

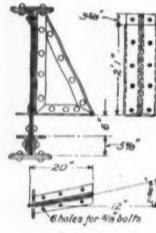


Fig. 5.

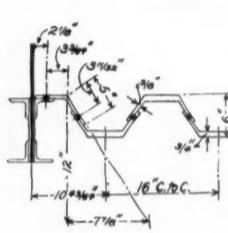


Fig. 6.

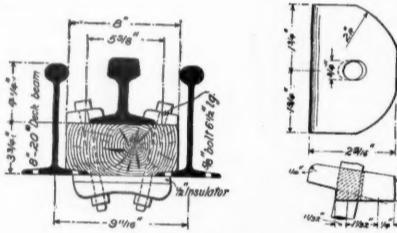


Fig. 8.

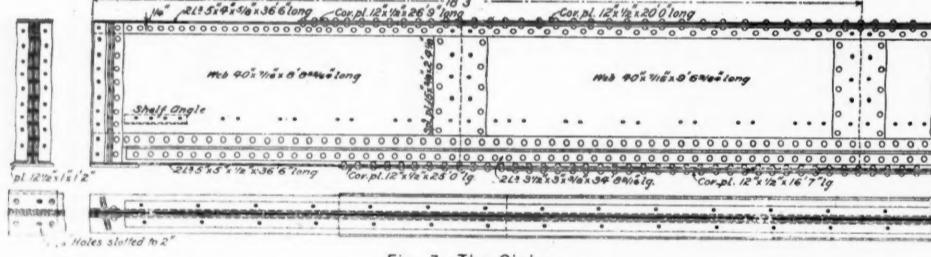


Fig. 7—The Girder.

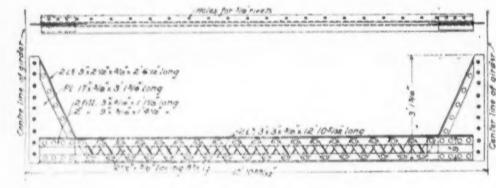


Fig. 4.

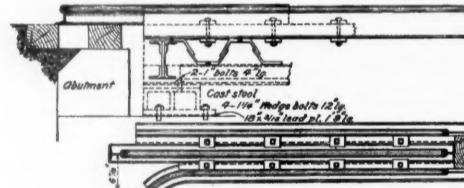


Fig. 9.

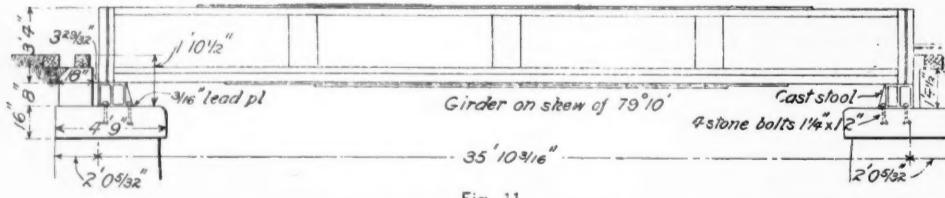


Fig. 11.

the total movement is: Home signals, .000014 (or 1 in 72,133); distant signals, 0.

*Between East Liberty and Bessemer.*—Home signals, 48; distant signals, 48; danger signals displayed from following causes:

|   |   |
|---|---|
| Broken rails.....                                     | 2 |
| Loose or broken track wires or renewals of rails..... | 1 |
| Rain and bad track.....                               | 2 |
| Airline freezing.....                                 | 2 |
| Switch bridle touching stock rail.....                | 1 |
| Broken battery jars.....                              | 1 |
| Loose spring in rotary switch box.....                | 1 |
| Division men unloading cinder.....                    | 1 |

|  |    |
|--|----|
| Total danger signals displayed.....                          | 11 |
| Total danger signals chargeable to failure of apparatus..... | 6  |

The estimated total movement of signals per year is: Home signals, 1,576,800; distant signals, 1,576,800; so that the percentage of failures to the total movement is: Home signals, .0000037 (or 1 in 262,800); distant signals, 0.

*Between Bessemer and Stewart.*—Home signals, 37; distant signals, 34; danger signals displayed from following causes:

|   |   |
|---|---|
| Broken rails.....                                       | 2 |
| Loose or broken track wires or renewal of rails.....    | 2 |
| Airline freezing.....                                   | 2 |
| Switch rail touching switch plates.....                 | 1 |
| Rain and bad track.....                                 | 2 |
| Spike driven so as to touch switch and stock rails..... | 1 |
| Broken wire battery to signal.....                      | 2 |

|  |    |
|--|----|
| Total danger signals displayed.....                          | 12 |
| Total danger signals chargeable to failure of apparatus..... | 6  |

The estimated total movement of signals per year is: Home signals, 910,310; distant signals, 802,370; so that the per cent. of failure to the total movement is: Home signals, .0000066 (or 1 in 151,718); distant signals, 0.

*Summary.*—Total failures chargeable to apparatus, 28; total signal movements (home and distant), 6,986,660; per cent. of failures of total signal movement, .000004.

Under the head of caution signals displayed unnecessarily, the record is *nil* on all three of the above-named sections.

We have shown the percentages as they appear in the report, but the basis on which the failures chargeable to defects of apparatus are separated from others is not clear; and, in any case, it will be necessary, in order to compare this record with that of the Illinois Central, to include the total number of failures, as the report from that road "includes everything"; we have therefore made the following table. We have counted only the home signal movements (3,641,240 on the Pennsylvania), as we understand that the Illinois Central has no dents.

| No. of movements to each failure. | Road.      | Remarks.           |
|-----------------------------------|------------|--------------------|
| Signal.                           |            |                    |
| Hall.....                         | Ill. Cent. | 43,600 Winter.     |
| Hall.....                         |            | 52,590 Summer.     |
| Westinghouse.....                 | Penn.      | 74,311 Whole year. |
| Timmis, wire circuit.....         | Liverpool  |                    |
| Overhead.....                     | 213,000    | One year.          |

The last item was recently reported to us by an English correspondent. Like the others, it is published in the shape it reaches us. For comparisons more accurate than those here shown we shall have to wait until the different roads agree upon a uniform method of reporting.

The Pennsylvania gives, in addition to the foregoing, an interesting table which does not appear in any of the other reports that we have received, to wit, the following:

#### *Failures to Safety and Cause Thereof.*

|   |   |
|---|---|
| Residual magnetism.....                                     | 3 |
| Pin valve freezing in bottom plug.....                      | 1 |
| Bad track, cinder ballast.....                              | 1 |
| Fouling wire, main track to siding, broken.....             | 1 |
| Cotter pin catching on cover of signal cylinder.....        | 1 |
| Block joints run together and bad track wires.....          | 1 |
| Leather packing too tight in signal cylinder.....           | 1 |
| Cil dripping from signal cylinder onto circuit breaker..... | 2 |

|  |          |
|--|----------|
| Total.....   | 11       |
| Per cent. of failure to safety of total signal movement= | .0000017 |

Or 1 in 635,151 movements (home and distant).

#### *The Homestead Armor Plate Trouble.*

Pursuant to the resolution of the House of Representatives, Secretary Herbert has made a report on the recent alleged violation by Carnegie, Phipps & Co. of their contracts with the United States in the manufacture of armor plate. The Secretary gives the history of the irregularities and describes the methods adopted to discover and to prove them.

The matter was first brought to his notice by an attorney representing certain employees of the Carnegie Co., who declared that they had in their possession information of frauds being perpetrated, which they would give the Government for a consideration. The Secretary agreed to remunerate the informants from the sum recovered if the information led to the recovery of moneys from the company, and a contract was made agreeing to give them 25 per cent. of such sum. The allegations were that the company had failed to temper the armor evenly and properly; that it had plugged and sealed blow holes and had re-treated plates which had been selected for tests and without the knowledge of the inspectors, so as to make these plates better and tougher than the groups of plates from which they were selected. This subsequent treatment of plates was done secretly and at night when the inspectors were absent from the works. The Carnegie Co., has always required that records be kept of the treatment of each plate, and these were made upon little slips of paper in pencil which were subsequently copied and sent to the government inspector. Under the direction of certain superintendents of the Carnegie Co., these records were changed

and false records furnished to the government inspectors. Some of these original slips in pencil were furnished by the informants and the slips showed on their face that they had been altered.

The Bureau of Ordnance was made acquainted with the facts and a committee appointed to make an investigation which sustained the charges of the informants. This committee assessed the damages sustained by the government at 15 per cent. upon the amount of armor delivered and upon all premiums paid to the company. Nothing in the testimony of the informants or in the report of the investigating committee indicates that the higher officers of the Carnegie Co. knew anything of these irregularities and there was nothing to show that any officer of the navy had connived at them.

When this information had been obtained the representatives of the Carnegie Co. were called to Washington, and the Secretary of the Navy demanded satisfaction for the damages resulting. The officers of the company denied all knowledge of the transactions and promised to make a thorough investigation. The Secretary having determined to assess the damages recommended by the Bureau of Ordnance, the Carnegie Co. appealed to the President and argued their case before him in the presence of the Secretary. After a careful consideration of the facts the President decided that the damages assessed should include material delivered between the 3d of November, 1892, and extend to the 16th day of September, 1893, nearly one year, that being the period over which the Government had proof of irregularities. The President, after considering the question at great length assessed the damages at 10 per cent. upon the amount manufactured during the period named which, as reported by the Bureau of Ordnance, was valued at \$1,404,894. The damages assessed were therefore \$140,489; \$35,121 of which was paid into the Bank of Pittsburgh to the credit of the informants and the balance, \$105,360, was credited to the Government for armor furnished by the company.

It is the opinion of the officers engaged in making the investigation that although a portion of the armor delivered was not equal to the very best armor that could be manufactured, yet that it was all good, made of the best quality of steel and nickelized thoroughly and equally throughout the mass, and that the armor is at least five per cent. better than the lowest limit of tolerance exacted by the contract. These irregularities occurred while the company was engaged upon light armor and before their heavy forging plant was put in operation for the manufacture of heavy armor of the battleships.

The attorney of the Carnegie Co. argued that, admitting the facts, as proved, no right existed to exact penalties or impose fines. The President and Navy Department were of a different opinion, and held that the company was responsible for the acts of its employees.

The report of the Secretary concludes with the statement that Superintendent Schwab has been removed from all authority over the manufacture of armor plates for the future, and that the department has assigned government inspectors to night duty whenever night work is done.

#### *Mr. Depew on the Trunk-Line Situation.*

At the meeting of the trunk line presidents in New York on March 15 the unsettled condition of competitive rates between Chicago and the Atlantic seaboard, which has now continued four or five months, led to a very serious discussion, and the speech of President Depew, of the New York Central, has been published by the newspapers. We give below the principal parts of this address:

We will approach the last ditch fast enough if the resolutions just offered and so strongly pressed shall pass. When we get there our roads will be run by the courts, and we, gentlemen, will have no further duties here or elsewhere. The situation is very plain. We entered into agreements which have been secretly violated. The five so-called weaker lines were given such differentials, or lower rates, as were supposed to be sufficient to enable them to secure and retain their share of the traffic. If these differentials were not sufficient, greater ones were to be allowed. In consideration of these concessions these lines agreed not to pay commissions. It now appears that in competition among themselves one of them has made a secret contract with a steamship line, which is to run during the whole of this year, to allow commissions of from one-half to one-third the total passenger fare from Chicago to New York. This line says it cannot break this contract, though it found no difficulty in breaking the one entered into with us. To meet this contract all, or nearly all, the differential lines are paying commissions on eastbound second-class passenger business.

The passenger business that we have been considering this morning, and which is affected by the irregularities, is, perhaps, 15 per cent. of the second-class passenger business from Chicago east. That is all there is of it. . . . We may as well take it for granted, if we have a war to the death, that neither Congress nor the legislatures will ever permit us to get back to our present tariffs or living tariffs. A war means that we will never get above \$15 for passengers to Chicago, and never above 15 cents a hundred on grain between New York and Chicago. I think the present demoralization has probably reduced us to a point where we will not again receive more than 20 cents on grain, and our passenger rates will cost us an enormous amount either in additional expenses or in issuing bonds to put us a

year hence back where we are now. We cannot long maintain present economies, and no possible economies would enable us to make up what we would lose by a war. I deprecate it; not because it punishes the roads which have been guilty of breach of faith and caused it, but because it punishes those which have not been guilty as well.

Railroad justice differs from the ordinary administration of it. In the ordinary administration of justice you catch the thief, impose a penalty and lock him up—or if a man violates his contract, a jury will impose the damages which he ought to pay. But until we get legislation in Congress which will enable us to make contracts which we can legally enforce, we cannot undertake to punish the guilty parties without also punishing the innocent.

The real trouble does not come from the weakness or incompetency or bad faith of these presidents, but from the conditions of ruinous competition. We all of us employ multitudinous agencies. The through passenger receipts from New York to Chicago yield about \$1,250,000 annually, and we spend \$250,000 in offices on Broadway, or 20 per cent., fighting for it. The way we can reduce expenses is to get rid of most of our agencies. I was told here of some traffic which was procured by one of the Western lines—one of the weaker lines—in its fight with another weak line last month, and when they came to make up their expenses they found that their outside offices, agencies and extra solicitors had cost them 22 per cent. of the gross they had received; that is, 22 per cent. was paid out before the traffic touched the cars.

There are twenty-eight fast freight lines on our roads, with twenty offices in Chicago to fight for tonnage regardless of rates. What they report to the officers of their lines of bad faith on other lines is believed, and then comes the order—"Keep your business at all hazards." I would be glad to see a resolution passed here, and one in the Central Traffic Association, that in every place of considerable importance in their respective territories there should be but one agent to give out passenger rates and one to give out freight rates for all our companies.

The immediate sore now is a very small matter on which to have a railroad war. It does not amount to two per cent. of the first and second class passenger business between Chicago and New York. I don't believe it amounts to one per cent.; and it seems to me that the differential lines could settle it among themselves.

I hope this Congress will take up the question of pooling, and that the greater enlightenment which prevails on railroad traffic will lead to the passage of a bill which will allow us to make contracts which can be enforced. But if you get the rates of the railway lines down to one-half of what they are, then when the roads get together again the Commission may insist that war rates shall be pool rates. That will be the cost of this war to the railroad companies. If we enter upon this railroad war at present, we will all be the sickest lot of men who ever gathered when we finally come together with chastened hearts and empty pockets, driven together by our indignant stockholders, to see if we cannot get back where we started from when the war commenced. I do not see why these five differential lines cannot agree to divide this disputed business equally, and let the line which has made this secret contract with its shippers give it up. We, the Central, will stand our share of an assessment to meet any damages that company has to pay for breaking it. As a railway lawyer of 30 years' practice, I would not give anything for your contract. There is no court in which it can be enforced. It is a contract against public policy, and a contract which the court would so declare if it ever came to a test. The only reason it is not broken is because it would hurt the pockets of those who made it. The road is afraid of damages, not from the courts, but because, if it breaks this contract, its patrons will not make another.

I am informed that the rate on iron, with no shipper asking for it, went down from 12 cents to 8 cents at Cleveland last week; the rates on grain to-day are practically down from 25 cents to 15 cents, with no shipper asking it—nobody asking it. We are doing this in the effort to get business which does not belong to us, and we each get the same tonnage as before. . . . We are collectively in serious danger of being put into that class of the able and unwise who are known as damn fools—that's the plain English of it—and the circumstances are such that the Recording Angel will blot out the epithet.

Now, I propose to submit as a substitute for these drastic measures:

First, that we renew our pledges to maintain in good faith our contracts.

Second, that we share *pro rata* any damages which may be assessed for getting rid of this secret arrangement of the offending line with a shipper.

Third, that we agree, under legal advice, to a contract to pay a penalty of \$10,000 whenever the Commissioners adjudicate any one of us guilty of rate-cutting or paying commissions.

The resolutions offered by Mr. Depew are still under consideration by the officers of the principal roads.

#### *The Business Depression in Monon.*

The recent order of General Superintendent Lowell, of the Monon lines, in relation to the use of intoxicants among employees, has resulted in closing the bar at the Monon House in Monon.

#### *The Western Extension of the Lake Street Elevated Road.*

The injunction obtained some time ago by property owners to prevent the construction of the Lake street elevated between West Forty-eighth and West Fifty-eighth streets has been dissolved by Judge Gibbons. The court held that the complainants should have commenced their proceedings before if they desired to stop the progress of the work instead of waiting until foundations for the structure were being put in before making their complaint. As to the contention that the property owners have a right to enjoin the construction of a road until the company pays or secures damages, the court holds that no damages have yet been sustained, the structure not having been erected and that no rule could be laid down for assessing damages, also that, if for any cause the defendants should see fit to abandon the enterprise in its earliest stages, the complainant would not be entitled to damages, and that the proper thing to do is to wait until the road is built and in operation, when it will be possible for a jury to consider all elements of damages which have arisen or seem likely to arise.

\* Resolutions said to have been offered by President Newell, of the Lake Shore, and seconded by President Roberts, of the Pennsylvania, abolishing differential passenger rates; which action would promptly lead, of course, to irregular cutting of rates by the weaker lines.



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#### EDITORIAL ANNOUNCEMENTS

**Contributions.**—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

**Advertisements.**—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The London *Economist* has a very complimentary article on the Chicago & Alton Railroad, which is largely due to its financial stability, this being one of the American companies which most nearly approaches the English in the proportion of debt to share capital, or rather of prior charges to total income. We took pains a few weeks ago (Feb. 23) to show the very narrow margin, even in prosperous years, of some companies which have failed recently, the Erie's fixed or prior charges having absorbed 98.7 per cent. of its gross earnings and 90.48 of its net income in the most favorable of the last three years, the Atchison's 95.36 and 85.83 per cent., etc. Now the Chicago & Alton's prior charges have been but once in many years as much as 80 per cent. of its gross earnings, and are often as little as 75 per cent., and have been from 37½ to 51½ per cent. of its net earnings; while a company as stable as the New York Central required last year 89.86 per cent. of its gross earnings and 32.08 of its net income to meet these charges. The truth is simply that a railroad company's safety, and of course its credit, is great when its debts are small; but it is one of those simple truths which are not always sufficiently appreciated. The Chicago & Alton is able still further to strengthen its position at the end of this month by retiring \$3,000,000 of 7 per cent. bonds with the proceeds of an issue of stock.

The General Passenger Agents of the Trunk Lines met in New York on Tuesday last and agreed to stop the payment of commissions and to restore all passenger rates on April 1. It is said that the details of this agreement were readily arranged in a manner very satisfactory to all parties, so that it is hoped the prevailing demoralization will be stopped. The extent of this demoralization and some facts concerning the attendant conditions are set forth in the address of the President of the New York Central, delivered at the Trunk Line meeting of March 15, and from which we print extracts in another column. Whether the agreement proposed by Mr. Depew will work any improvement remains to be seen. Probably the penalty of \$10,000 for non-maintenance of rates will not be incorporated in the agreement at present. This matter is now in the hands of the lawyers who are at work endeavoring to agree upon a form of contract which can be enforced at law. Should such a contract be agreed upon it will then be formally submitted to the lines for signature. Pending the signing of the penalty provision, the Commissioners have had their authority to equalize traffic, by ordering temporary reductions in rates, extended indefinitely. This power is to be exercised whenever any line fails to receive its share of the business in either direction at regular rates. It is also provided that any road with drawing from the agreement shall forfeit any right to a division of the traffic.

#### Grade Crossing Laws.

The New York State Railroad Commissioners have completed their bill for promoting the abolition of grade crossings, and the Senate Railroad Committee

will give a hearing on the subject in New York City to-day (March 30). The bill provides that hereafter no steam railroad shall cross a highway at grade; that no new highway shall cross a steam railroad at grade without the consent of the Railroad Commissioners, and that hereafter, upon petition of communities or railroads, the Railroad Commissioners may order that any existing grade crossing be changed to an over or under crossing, the expense of such change to be assessed 65 per cent. on the railroad company, 25 per cent. on the community benefited, and 10 per cent. to be borne by the state, the state's portion of such expenses not to exceed \$100,000 a year.

These provisions are somewhat different from those of the Massachusetts law, it will be seen. In the latter state the maximum amount obtainable from the state treasury yearly is \$500,000, and the payments by the state are equal, substantially, to 25 per cent. of the total outlay; so that in Massachusetts the law provides for spending \$2,000,000 a year, while in New York the maximum will be \$1,000,000, though New York has about 7,900 miles of road to 2,119 in Massachusetts. The railroads will fare the same in both states. The New York proposition to assess the "community" 25 per cent. probably contemplates the inclusion of other towns than the one in which the crossing lies; but the simplicity of the Massachusetts plan would seem to be preferable, and the percentage (10) certainly is more equitable in the cases of very poor towns. This consideration would apply in many cases in sparsely settled districts even if the assessment were divided among two or more towns. The idea of fixing the percentages by law is the most novel thing in the proposition. The fact that nearly every case adjudicated by a special commission in Massachusetts has been settled on the same basis—65 to the railroad, 25 to the state and 10 to the town—would seem to almost justify this, but we understand that there have been cases where the town was assessed only five per cent.; and the million-dollar elevation in Boston (Roxbury), which was provided for by a special law, is apportioned 55 per cent. to the railroad, 31.5 to the state and 13.5 to the city. It will be possible, of course, to include in the "community benefited" a very large territory and thereby to make 25 per cent. in New York no harder for the towns to bear than the 10 per cent. in Massachusetts; but as we have just intimated, that plan would introduce considerable complication.

Probably this bill is as favorable to the railroads as anything that would be likely to receive the approval of the legislature. Though 65 per cent. is in some cases more than the railroad ought to pay, it is to be remembered that rich roads sometimes pay more than this for an improvement which is especially necessary to the railroad; and that in special cases like that at Roxbury, Mass., special laws can be made. Moreover, the general proposition that the duty of taking the initiative may be always laid upon the railroad has just received definite support by a decision of the United States Supreme Court in a Connecticut case. Under a statute of that state enacted in 1889, the New York & New England road had been ordered by the Supreme Court of Errors to abolish certain grade crossings in the town of Bristol. The company appealed to the Supreme Court of the United States, and asked that the order be reversed on the ground that it was contrary to the State and Federal Constitutions, because the company had not the means to pay for such removal of grade crossings without using the money required to pay [interest to?] the holders of its bonds and preferred stock, and that therefore the statute was void, as impairing the obligation of contracts. The United States Supreme Court decides that the statute was not void on the grounds suggested; that grade crossings are a menace to public safety, and that state legislation to require their removal is constitutional. It must be admitted that the defense of the New York & New England people was a novel one, that their obedience to a law should depend upon their ability to meet their contract obligations. In the same manner every man might deny the constitutionality of his poll tax because it disabled him from meeting his grocery bills.

The New York & New England is a poverty-stricken road, but its trains probably run fast enough to kill people as quickly as would be the case on other roads; and it will have to make the best terms possible. Connecticut, however, is not disposed to be severe with the railroads in this matter. Where the street is older than the railroad the railroad commissioners may assess one-fourth of the cost upon the town, and where the railroad is the older a larger share, not exceeding one-half, may be charged to the town; and the state has taken action to lessen the friction between towns and railroads, the same as Massachusetts has done, though not in the same way nor so extensive. The last legislature authorized the State Treasurer to reimburse all towns for all

they had paid out on this account since May 1, 1885, in cases where the improvement was made upon the application of the railroad.

#### The Armor Plate Case and the Law of Contracts.

The decision of President Cleveland in the matter of the armor plate frauds reported in another column will be interesting to engineers and contractors who are supervising and doing contract work under contract stipulations of forfeiture. We have not at hand the contract between the government and the Carnegie Company, but from the report of the Secretary to Congress it seems that the attorney of the Carnegie Co., made a nice point when he argued against the government's right to assess penalties under the circumstances. Without doubt the law of agency would make the acts of the company's employees the acts of the company. Since 1709 it has been held that a principal is answerable for a fraud committed by an agent in the course of the principal's business and for his benefit. But then the question is, would the Carnegie Company have been liable if it had committed the irregularities itself.

The contract sought to guard against just such contingencies by the appointment of an inspector to watch over and direct the work, and to prevent irregularities. If they have failed to do their work it may reasonably be said that the government has been guilty of contributory negligence, and is at fault as well as the company. The fraudulent acts committed can not be held within the scope of the duties or employment of the company's servants.

Similar cases are met frequently on engineering and architectural work, and there are many decisions in the law books. New York City has furnished her full share. For every construction contract stipulations are prepared in anticipation of just such deceptions and fraudulent practices on the part of contractors.

When work has been undertaken, completed and accepted under the direction, supervision and final approval of an engineer, architect or inspector of the owner, city or government, then can the contractor be called to account for poor materials, defective work, or for injuries resulting from the same?

An English case is directly in point, where a railroad company had entered into a contract for the manufacture and delivery of rails. The contract stipulated for inspection, testing and approval of the work, and it also expressly provided that such approval should not in any way relieve the contractor from the condition and stipulations contained in the specifications as to the materials, work and tests. Power was given to the engineer to reject any rails or fish plates he disapproved on any ground whatever, and his decision on any points of doubt or dispute were made final and binding on the parties. It was further provided that the inspection of the engineer should not in any way commit the company to the approval and acceptance of rails, etc., which were not in strict accordance with the specifications and plans. The rails were found defective after they had been delivered, paid for and half of them laid, and it was held that the company could not recover from the contractor, but that the acceptance of the engineer was conclusive.

It is impossible to ascertain from Secretary Herbert's report, as given to the press, just what the duties and powers of the government inspectors were, or whether the contract for these plates in question was entire or separable, but if the inspectors were clothed with the authority usually bestowed upon engineers in construction contracts and the plates had been accepted and the contract fully executed, and *there had been no fraud practiced by the contractor*, the government could not have had a recovery. This belief is based upon a long line of cases, some of which are very recent.

A case in point is that of the Potomac Steamboat Co. vs. Harlan & Hollingsworth Co. The contract stipulated that the machinery of a steamboat should be of the best material throughout, and the workmanship first-class. The steamboat company was to furnish a suitable and competent person to superintend the construction, and with the right to reject anything not equal to the requirements of the contract and inspect the work, and every facility was afforded him to inspect the work and materials at all times. After the boat was completed, delivered and accepted, the straps of the starboard walking beam gave way and caused serious injury, and it was held that the damage was due to the negligence on the part of the steamboat company's agents and there could be no recovery.

Another case practically in point is that of Beswick vs. Platt, decided in the Pennsylvania courts in 1891, which held that when a company has furnished plans and specifications to the contractor, and has accepted the work after seeing it in progress and completed, it

cannot recover from the contractor the money paid him because the work proves defective and injury results. This contract was for the construction of a wharf which afterward gave way.

When the decision of architect or inspector is not made binding on the parties, it has been held that his acceptance of inferior materials will not bind the owner nor relieve the contractor from performing his agreement in strict conformance with the contract. And if work has not been accepted the payment of progress certificates will not constitute a waiver by the government of defects in quality which were not apparent from inspection. Upon this ground of no final acceptance the demand of the government for indemnity might be sustained.

The courts of Nebraska have held that under a clause frequently employed in construction contracts, which provides that "the engineer's certificate shall in no way lessen the contractor's final and total liability, or exempt him from liability to replace work afterward discovered to have been ill done," the owner might recover damages for the use of poor materials and defective workmanship. Such a clause would sustain the government's position if incorporated in the contract.

Whether the fraudulent acts of a contractor in concealing defects would permit a recovery after acceptance may well be doubted. There are numerous cases that employ language that *intimates* that a recovery can be had. Some frequent expressions with courts are as follows: "That the settlement having been made without any false or fraudulent representations of the contractor," "in the absence of fraud or gross mistake," or "the contractor having acted in good faith," then the city or owner cannot recover back money paid for work that has been inspected and accepted by engineers. The cases are extremely rare where an actual recovery has been had in the courts on account of fraud on the part of the contractor, though there are many cases with *dicta* that recovery cannot be had if there is no fraud or deceit.

Poor materials and work are often if not usually the result of the arbitrary and willful intention of contractors to save themselves expense, and should not be a matter of much difficulty to prove. The question that was at issue between the government and the Carnegie company presents two additional features, viz., that the acts of the employees of the Carnegie company were unlicensed, and that there was contributory negligence on the part of the government inspectors.

It is assumed that the government had probably retained large sums of money pursuant to a stipulation providing for just such an exigence, and the government was in position to exact the payment of fines. From the Secretary's report to Congress it would seem that a clause existed in the contract empowering him to declare the contract at an end; and the fact of his having threatened to do so if the company did not pay the fine would indicate that fact. In such a case there was nothing for the Carnegie company to do but to pay the fine or forfeit its contract. Without a copy of the contract it is impossible to say what the absolute rights of the Carnegie company were in the matter, but without doubt it was the best policy for the company to pay the fines imposed.

Whatever may be the law of the case it is a matter of profound regret to all patriotic men that the thing has happened, for it is a national disgrace. It reveals in one of our greatest and best known manufacturing companies a very low idea of commercial morality, or a singularly lax and inefficient organization, or both. It shows, too, discreditable carelessness on the part of the government's inspectors.

#### Notes from the Pennsylvania Report.

The Pennsylvania Railroad report issued to the stockholders, through brief, is much fuller than that advertised in the newspapers in the first week of March, and especially more valuable by giving the earnings from different sources, the working expenses under five general heads, and the traffic of the three grand divisions of the railroad worked directly by the company. Taking these all together, passenger traffic decreased 3.6 per cent., passenger earnings 2.5 per cent., freight traffic decreased 2.1 per cent., and freight earnings 3.9 per cent. These are not considerable changes: those in working expenses are most interesting. Of a total decrease of \$1,823,344 in these, no less than \$1,311,764 was in maintenance of way, the cost of which was reduced 16 per cent. Now, for the first half of 1893 the total working expenses were \$1,211,937 (5 per cent.) greater than in 1892; so that the decrease in the last half of the year was \$3,035,281, which is 12 per cent.

There is, perhaps, no railroad in the country in better condition than the Pennsylvania to make such reductions, or which is less likely to make "savings" of the kind which cost twice as much next year as is saved this year. Long continued improvement of the roads,

changed to maintenance, has alone made such a reduction possible now.

The course of maintenance of way expenses for the last five years is shown below:

| 1889.   | 1890.       | 1891.       | 1892.       | 1893.       |
|---|-------------|-------------|-------------|-------------|
| \$7,097,062   | \$7,752,547 | \$7,678,356 | \$8,165,951 | \$8,873,193 |
| Thus from 1889 to 1892 they increased \$1,068,892, or 15 per cent. The course of the traffic meanwhile was: |             |             |             |             |
| 1889.   | 1890.       | 1891.       | 1892.       | 1893.       |
| Millions of ton-miles....   | 6,220       | 7,042       | 7,120       | 7,613       |
| Millions of passenger-miles   | 727         | 779         | 795         | 814         |

From 1890 to 1892 the increase in both kinds of traffic was about eight per cent., but from 1889 to 1892 it was 22 per cent. in freight and 16 per cent. in passengers.

The decrease in the other items of expenses from 1892 to 1893 were comparatively trifling: 2.2 per cent. in maintenance of cars, less than one per cent. in motive power and 1.2 in conducting transportation.

The passenger traffic is comparatively much more important on the Pennsylvania's New Jersey lines than on its Pennsylvania lines; about one-fifth of the New Jersey lines are main lines, and a little more than one-fifth of the Pennsylvania lines. The travel last year was equivalent to 1,080 passengers each way daily in New Jersey, and to 341 on the Pennsylvania lines, the 463 miles in New Jersey having but 9 per cent. less passenger traffic than the 1,647 miles in Pennsylvania. The freight traffic makes a very different showing, the Pennsylvania lines having the equivalent of 4,395 tons each way daily; the New Jersey lines, only 2,537 tons, though that is a pretty large "only." The Philadelphia & Erie, which hardly counts as a passenger carrier (7 each way daily), has a heavier freight traffic than the New Jersey roads (3,200 tons each way daily). Coal and iron are at the bottom of the great Pennsylvania traffic. The 385 millions of ton-miles on the New Jersey lines yielded last year \$7,540,937 of freight earnings; and the 410 millions on the Philadelphia & Erie, only \$6,374,874. But here we have to deal with something more than the difference in classes of freight. The New Jersey lines have a large allowance for the terminal expenses of through freight, and they need it; for the cost per ton-mile was 0.983 cent on them, against 0.839 on the Pennsylvania Railroad Division and 0.331 on the Philadelphia & Erie. The profit per ton-mile is nearly the same on the three lines, 0.166, 0.175 and 0.165 cent on the three grand divisions, averaging 0.167 cent. A sixth of a cent per ton-mile, at the rate of 74 cents per ton between New York and Pittsburgh, and \$1.52 from New York to Chicago, for the use of the road and rolling stock—that seems very little. Yet it was enough to pay a fair interest on the capital invested.

We noted some time ago the effect of propinquity on World's Fair travel, the gain in passenger earnings on the Michigan Central, for instance, having been nearly three times as great as on the New York Central. The report of the Pennsylvania Railroad for 1893 gives a further illustration of the same fact. The figures are for the entire year, and not for the six months of the Fair, like others we have given, but they will serve nevertheless, the tendency of passenger traffic having been to decrease whenever there was no special stimulus. Now on all the lines worked or controlled by the Pennsylvania Railroad Company east of Pittsburgh and Erie there was a decrease of 51 millions of passenger miles in 1893, amounting to 4 per cent.; while on all the lines west of Pittsburgh and Erie there was the very large increase of 24.4 per cent., amounting to 117 millions of passenger-miles. That the country on the Western lines was not more prosperous than that on the Eastern lines may be judged from the fact that while freight traffic decreased 2½ per cent. on the Eastern lines, it decreased no less than 12 per cent. on the Western lines—the latter an extraordinary falling off.

#### Track Elevation in Chicago.

We gave last week a very brief statement of the conditions of the ordinance which has just passed the Chicago City Council with regard to the elevation of certain tracks in that city. The matter is so important, and the prospect that something will be done to carry out this great work is now so good, that it appears worth while to explain the present situation somewhat more fully.

Last October, Mr. G. Howard Ellers, Consulting Engineer in special charge of track elevation for the city of Chicago, made to Mayor Harrison a special preliminary report on the proposition of the Pittsburgh, Fort Wayne & Chicago to elevate the tracks for a certain distance in that city. In considering this subject Mr. Ellers starts with the fundamental idea that no system or plan can be devised applicable to all the railroads within the limits of the city, because the conditions are so different, and the interests so diverse that an attempt to formulate a general plan, while desirable in theory, would be impossible in practice. It has long appeared to us that this must be true and that any immediate relief can only be got by treating each railroad, or group of railroads having common interests, as a special case.

The proposition of the Pittsburgh, Fort Wayne & Chicago contemplated a maximum elevation of 8 ft. and a depression of all intersecting streets by 5 ft. or more, the closing of one street, the carrying of another over the railroad tracks, and beginning the work of elevation south of Archer Avenue, leaving undisturbed a particularly dangerous grade crossing at the intersection of Stewart and Archer avenues, or compelling

the erection of a viaduct at that place. Mr. Ellers after considering this proposition took a middle ground between the extreme elevation of all tracks on one hand and the proposition of the railroad company.

He suggests beginning the elevation 1,150 ft. north of the Archer and Stewart avenues point at the river, say 1½ miles south of the passenger station, and carrying a grade of 0.5 per cent. until a maximum elevation of 10 ft. is reached. This elevation would be maintained southward substantially to point between Forty-sixth and Forty-seventh streets, say about three miles from the beginning of the work, from which point he would descend to present grade in an area now occupied by yards with many tracks of various companies, the Pennsylvania lines having there about 55 miles of track. In this distance the grade would dip at one point to pass under an existing viaduct at Thirty-fifth street, which viaduct now carries the street over the yards of the Chicago & Eastern Illinois, where there are some 47 parallel lines of track, the viaduct having an elevation of about 20 ft. Leaving the yards south of Fifty-first street, the Pennsylvania would again begin to ascend, being carried to the standard of 10 ft., and finally descending to the present surface at the south end of the proposed work in the vicinity of Seventieth street, a little more than six miles from the beginning. At Forty-eighth street the tracks of the Chicago & Western Indiana, which to that point could be carried on the same bank and bridges as the Pennsylvania tracks, diverge westward and will require a separate elevation, which should be carried as far as Seventy-second street. The descents to yard grades which occur on both of these lines would be within the yards of the companies and would not interfere with the proposed subways.

Streets would pass beneath the railroad track at 30 points and over at one; that is the existing Thirty-fifth street viaduct. With two exceptions it is proposed to depress the intersecting streets 3 ft. 6 in. between the curb lines and to maintain a clear headway of 12 ft. The sidewalks would not be depressed but could be carried through on their normal level. By using 4 per cent. grades the length of the approaches could be kept within 88 ft., or using 5 per cent. grades within 70 ft. At Archer and Stevens avenues, however, the depressions must be about 7 ft. There is one other point where greater depression must be used than the proposed normal of 3 ft. 6 in., namely, at Fifty-first street. Here are 112 parallel lines of track occupying a space measured on the line of Fifty-first street of over 1,450 ft. The Pennsylvania people propose to close Fifty-first street and carry it into Fifty-second by the viaduct, but Mr. Ellers thinks that there is too much street traffic for this, and suggests a subway in which 12 ft. could be got by depressing the road to 10 ft. 6 in. and raising the tracks 3 ft. on the line of the street.

He considers the question of drainage as not difficult. Most of it could be intercepted at or above the level of the sewers, that going below the sewer level could be pumped.

Jan. 3 Mr. Ellers made a report to the acting mayor on a similar scheme for the Lake Shore and the Rock Island, which companies propose to elevate their tracks from the St. Charles Air Line on the North, about Sixteenth street, to Sixty-first street on the south, a total distance of 5.35 miles. North of this point, that is, from Sixteenth street to Van Buren street passenger station, about 1.1 mile, the tracks pass through the "central switching district," where the number of tracks and their numerous intersections render any present disturbance of their position impracticable. Hence, the northern point fixed seems to be the only one that could be taken with any hope of immediate execution of the work. The Lake Shore and the Rock Island occupy the same roadbed and right of way for 0.46 miles. They propose to begin the elevation, as stated, on the south line of the right of way of the St. Charles Air Line; that is, about 160 ft. north of the north line of Sixteenth street; then to use a 0.45 per cent. grade until an elevation of 5 ft. 6 in. is reached above the present tracks; then to run a practically level line to the existing tracks under the Sixty-first street viaduct. At Sixty-first street the lines diverge and must be treated separately. The railroad companies ask for the closing of three streets.

Mr. Ellers suggests certain modifications. He would begin the work at the same point, but use a grade of 0.5 per cent., reaching an elevation above the present track of 8½ ft., and departing from the elevation suggested by the railroad companies at various points on the line. The total length of the proposed work on the Lake Shore is about 6½ miles, and on the Rock Island about 6½. He recommends the construction of street subways on the joint work at 29 streets; on the Lake Shore alone at two streets, and on the Rock Island at seven streets. The subways recommended on the Lake Shore would necessitate the elevation of some 27 lines of track at the crossings of Sixty-third and State streets, and while this work would be expensive he thinks that there would be compensating advantage in that it would convert the extensive yard system in the neighborhood into a gravity yard.

The recommendations submitted by Mr. Ellers were the result of numerous conferences with the officers of the railroad companies, and consequently they were made with reasonable hope that they would not be opposed.

On the 19th of this month an ordinance passed the

City Council by a vote of 57 for to 3 against, giving permission to the Lake Shore and to the Rock Island to elevate their tracks essentially on the lines suggested. An abstract of the ordinance follows:

The elevation is to begin on the south side of the right of way of the St. Charles Air Line. The grades and distances follow:

| Grade, per cent. | Distance, ft. | Elevations attained above present track. |
|------------------|---------------|--|
| Plus 0.5         | 2,000         | 8½ and 10                                |
| Level            | 3,000         | 8½ and 10                                |
| Plus 0.2         | 2,000         | 10 and 9½                                |
| Level            | 3,000         | 9½ and 9¾                                |
| Plus 0.25        | 800           | 9¾ and 10                                |
| Level            | 3,350         | 9¾ and 10                                |
| Minus 0.2        | 1,000         | 8 and 4½                                 |
| Minus 0.3        | 1,000         | 5  |
| Level            | 1,600         | 6  |
| Plus 0.3         | 1,000         | 8  |
| Level            | 700           | 8  |
| Minus 0.3        | 1,000         | 4  |
| Level            | 2,300         | 5  |
| Plus 0.33        | 1,800         | 5  |
| Level            | 4,300         | 9  |

#### Lake Shore.

Minus 0.2 ..... 1,600 6½ and 6  
From this point, grade will descend at the will of the company to the level of its yards.

#### Rock Island.

Plus 0.2 ..... 1,000 10  
Level ..... 1,850 10 and 9  
Minus 0.12 ..... 2,300 To present grade  
Minus 0.5 ..... 2,200

The streets to be depressed are 31 in the joint work, two on the Lake Shore and seven on the Rock Island. Furthermore, whenever four other streets are ordered vacated the railroad companies must defend any suits for damages arising from such vacation.

The minimum clearance is to be not less than 12 ft. for the streets and not less than 7½ for sidewalks. The railroad companies are required to pave the subways with brick on 9 in. of hydraulic cement concrete and to pave the sidewalks with concrete. They also are to bear the expense of grading the approaches and paving the approaches with cedar blocks. Wherever alleys are now open and intersect the streets to be sunk, the railroad companies must grade these alleys down to those streets. Street railway companies, however, occupying the present streets are to stand the expense of depressing their own tracks. The railroad companies are to bear the expense of draining the subways whether by gravity or by pumping, and of diverting all pipes and other conduits.

The bridges over the streets are to be of iron or steel with masonry abutments and to have either solid floors or to be provided with such device as will carry off storm water and prevent any dripping into the streets below. At the street crossings they may set the abutments back far enough to leave room for stations and stairways. All of the work is to be subject to the approval of the Commissioner of Public Works.

It must be begun before Aug. 1, 1894, and carried on at the rate of 1½ miles a year. In case of lawsuits arising to obstruct the work, the time occupied in those suits shall not be counted against the companies, but the city is to have the right to intervene in any such suit. The railroad companies are to indemnify the city from all costs and damages arising from this work and to defend such suits at their own expense, except that the city is to pay land damages arising from the change of grade of any streets that have been established since the acquisition of the rights of way by the railroad companies, and suits for such damages the city will defend. Within 90 days after the passage of the ordinance the railroad companies are to notify the Commissioner of Public Works of the point at which work will begin. If they fail to notify the Commissioner, within the time limit, of the point at which work will begin, or if they fail to commence work within the time limit, or if they fail to complete the work within the time specified, they shall be liable to a fine of not less than \$200 for each day. They shall not be permitted to run locomotives over tracks at grade within the limits set out for the elevated ways after the time set for the completion of the work, and shall be subject to a fine of not less than \$100 and not more than \$200 for violation of this provision. After the elevation of tracks has been made, trespassers upon the embankment or structure shall be liable to a fine of not more than \$100 and not less than \$10 for each offense. All regulations as to speed of trains, as to signals, maintenance of gates and flagmen shall cease to apply after the operation of the elevated structure has begun; but the railroad companies shall be required to light the subways. All of this is conditioned upon the railroads making a contract within 30 days after the passage of the ordinance, to carry out the work within its terms.

With only a very superficial knowledge of the situation, we should suppose that the conditions laid down in the ordinance are quite moderate, and as satisfactory as the companies could hope to get, although, of course, the costs will run up into the millions, and the companies may find it inexpedient to assume the obligations within the very short time limit specified. In fact, this would seem to be the weakest part of the scheme—that the time for acceptance by the railroads and the time for beginning work are made too short, considering the business situation. Of course, the directors of the railroad companies have yet to be heard from, and it is quite impossible to predict what they will do.

The British Board of Trade has issued a return showing the number of railroad employees killed and injured in each of the last 13 years (1871-1883) and in 1870,

#### RAILROAD EMPLOYEES KILLED AND INJURED IN GREAT BRITAIN AND IRELAND AND IN THE UNITED STATES.

|                            | 1892.    | 1891.    | 1890.    | 1889.    |
|----------------------------|----------|----------|----------|----------|
|                            | U. K.    | U. S.    | U. K.    | U. S.    |
| Total number employed      | 381,626* | 821,115  | 381,626* | 784,285  |
| Number killed              | 534      | 2,554    | 519      | 2,660    |
| Pro. of killed to employed | 1 in 714 | 1 in 322 | 1 in 695 | 1 in 296 |
| Number injured             | 2,915    | 28,267   | 3,161    | 26,140   |
| Pro. to employed           | 1 in 130 | 1 in 29  | 1 in 120 | 1 in 30  |

\* Estimated.

1873 and 1877. It covers all casualties in which the movement of vehicles was concerned, such as coupling accidents, falling off cars or engines and coming in contact with overhead bridges; while attending gates or switches; being struck by trains while walking on the track to or from home, etc. For the years 1889-1892 these figures, compared with those for the United States, reported by the Interstate Commerce Commission, are shown in the accompanying table. (Our years end on June 30; the English on Dec. 31.) We cannot tell whether the American figures included any casualties not covered by the British report—such, for instance, as injuries to men in freight-houses or shops—because the reports are not published in sufficient detail; but probably the total would not be greatly affected by the inclusion or exclusion of such figures. In the New York State report for last year only 4 killed, out of 306, could be excluded as not belonging in the classes shown in the British report. It appears that in England as well as here some of the railroads interpret the regulations about as they please and the report calls attention to the inexplicable discrepancies between the proportions on different roads. The Midland, for instance, in 1892 injured 1 employee in every 363, while on the London & Northwestern it was 1 in 76. The number killed, however, was about equal on the two roads. It will hardly be worth while to search for the reasons for the apparently much greater mortality in the United States than in Great Britain. As we have just intimated, the average number of injuries is doubtless unreliable in both reports; but the liability of being killed is apparently more than twice as great, in each year, in the United States than in England. The fact that there are about 19 employees to each mile of road there, as compared with five here, doubtless explains much of the difference, for the additional employees are largely in positions but little exposed to danger, such as that of signalman and passenger station porter. The Board of

transportation questions are enabled to accomplish results which to the individual shipper involve such difficulty as in many instances to deter him from undertaking them.

Comptroller Roberts, of the State of New York, has made statement that \$1,640,000 of taxes actually paid into the State Treasury by transportation companies prior to 1887 have been rebated on various grounds. Of this amount \$398,827.45 was rebated by Mr. Chapin while in office; \$1,108,255.42 by Mr. Wemple, and \$132,485.22 by Mr. Campbell. The bulk of these rebates were paid under the opinion of the Comptrollers that interstate business was not taxable. This belief was based upon a decision in the United States Supreme Court reported in 122 U. S. Reports 326, and other early cases, which seemed to decide that a statute which levied a tax upon interstate commerce business was contrary to the federal constitution, which gives Congress the sole power to regulate commerce between states. In a later decision of the United States Supreme Court reported in 142 U. S. Reports 217, the constitutionality of the statute was established, and it has been sustained in several subsequent decisions by the same Court. The Court holds that the tax is not assessed on interstate business, but is on the privilege of exercising corporate powers within the state; and that a fair way of determining the amount of tax is to assess the amount of business done. Ex-Attorney-General Rosendale and Attorney-General Hancock are said to hold the later view. A test case has been brought by the Comptroller against the Dunkirk, Allegheny Valley & Pittsburgh, and it has been decided in General Term in favor of the State and against the railroad, and it has been carried to the Court of Appeals for final adjudication. The reports current about defalcation in the Comptroller's office have grown out of the determination of Comptroller Roberts to recover \$130,000 remitted by ex-Comptroller Campbell last November to the railroad companies, in the face of the United States Supreme Court and State General Term decisions mentioned, and an investigation of the records of the office that has followed. These rebates seem to have been paid under the Comptroller's construction of the law, and as the statute does not limit his almost absolute discretion in assessing, fixing and collecting the tax, and reporting upon it, it will be difficult to adjust past irregularities, if they are found to exist.

From a statement of the gross and net earnings of the Chicago & Northwestern Railway for each of the last six months of 1893, published in the *Commercial and Financial Chronicle*, it appears that while in the first half of the year there was an inconsiderable decrease in gross earnings (\$103,059 = 3% per cent.), and a considerable increase in working expenses (\$490,633 = 4.7 per cent.), in the last half the earnings and expenses were:

|                | 1893.        | 1892.        | Decrease, P. c. |
|----------------|--------------|--------------|-----------------|
| Gross earnings | \$17,681,561 | \$19,330,663 | \$1,646,099 8.5 |
| Expenses       | 1,840,088    | 12,311,708   | 1,401,520 11.5  |

Net earnings ..... \$6,814,476 \$7,088,955 \$244,479 3.1  
Thus the large decrease of earning was reduced to an apparently innocuous condition by the great decrease in expenses. This is so great and important a system that its workings have great significance. The large decrease in earnings in the last half of the year were in spite of the World's Fair travel, which must have been great on this road, with its three different lines into Chicago, and the populous and prosperous country on them within easy reach of that city, but we have not yet any separate statement of passenger earnings.

The Mexican National Railway, which, like the Indian railroads, receives its earnings and pays for its local supplies in silver, and must pay gold for imported supplies and interest on its bonds, had \$1,638,438 of net earnings in silver last year, to convert which into the currency which its creditors require cost no less than \$761,929, leaving practically only \$876,509—a very different figure. The President of the company says that so far there has been no advance in Mexican wages or prices of native supplies in consequence of this depreciation of the currency. How misleading the statement of net earnings in silver is may be seen from the figures below, which give first these net earnings, and second the amount after subtracting the premium paid to enable the company to pay that part of its debts which is payable in gold:

|                      | 1890.    | 1891.       | 1892.       | 1893.       |
|----------------------|----------|-------------|-------------|-------------|
| Net earnings, silver | \$37,704 | \$1,159,020 | \$1,700,613 | \$1,638,438 |
| " " less discounts   | 676,275  | 944,534     | 1,096,277   | 861,854     |

The latter is the true income. From the silver net earnings it would appear that they had doubled since 1890; but they will pay only 27½ per cent. more interest on dividends to the English and American bond and share holders.

The British Board of Trade has taken action under the Railway Regulation Act of 1893, the first action of the kind that we remember to have noticed, looking to the regulation of the hours of labor on railroads. A

| Name of Railroad.  | Computed No. of Persons Employed | No. of Persons Killed | Proportion to No. Employed | No. of Persons Injured | Proportion to No. Employed |
|--------------------|----------------------------------|-----------------------|----------------------------|------------------------|----------------------------|
| Great E'st'rn.     | 20,867                           | 28                    | 1 in 758                   | 109                    | 1 in 191                   |
| Gr'at N'rth'r'n    | 21,160                           | 30                    | 1 in 748                   | 73                     | 1 in 303                   |
| Lanc. & York-shire | 21,659                           | 34                    | 1 in 734                   | 358                    | 1 in 69                    |
| N'rth E'st'rn.     | 33,114                           | 22                    | 1 in 1,491                 | 296                    | 1 in 112                   |
| Lon. & N. W.       | 57,898                           | 62                    | 1 in 934                   | 796                    | 1 in 73                    |
| Midland            | 44,764                           | 49                    | 1 in 921                   | 118                    | 1 in 379                   |
| G't Western        | 44,041                           | 48                    | 1 in 917                   | 340                    | 1 in 130                   |
| Lon. & S. W...     | 15,383                           | 20                    | 1 in 769                   | 149                    | 1 in 103                   |
| S'th Eastern       | 8,916                            | 15                    | 1 in 600                   | 21                     | 1 in 430                   |
| Lon. B. & S. Coast | 10,101                           | 11                    | 1 in 918                   | 30                     | 1 in 341                   |
| Caledonian         | 12,023                           | 35                    | 1 in 348                   | 124                    | 1 in 97                    |
| N'th British       | 14,813                           | 28                    | 1 in 522                   | 84                     | 1 in 175                   |
| Highland           | 1,885                            | 4                     | 1 in 524                   | 1                      | 1 in 1,571                 |
| T' for U. K.       | 378,859                          | 483                   | 1 in 785                   | 2,832                  | 1 in 134                   |

Trade report gives the figures for each of the 13 principal roads, and the London *Economist* has made up the above table of averages.

The business men of Rochester, N. Y., are talking of establishing a freight bureau like those at Kansas City, Chicago, Cincinnati and elsewhere, and they have sent a committee to the last named city for information; and we quote a paragraph from the report of that committee, which shows that this organization, after four of trial, is giving satisfactory results, and that the years principles on which it was established are sound. Most of the information came from Mr. E. P. Wilson, the Commissioner, but members of the Cincinnati Chamber of Commerce corroborated his statements. They said in substance:

The cardinal principle of the Cincinnati Freight Bureau is no hostility between carriers and their patrons—their interests being mutual, and upon the prosperity of both depending the advancement of the community. Nevertheless, whenever the interests of Cincinnati are menaced by discrimination, the bureau comes to the front for active work in behalf of its constituency. All fair claims secure instant attention, and the bureau finds that railroads invariably settle legitimate claims. Indeed, it has frequently secured payment of claims previously considered hopeless. Diplomacy is preferred to offensive aggression. The bureau does not grow tired or impatient, but pursues each subject to a conclusion. Experience has demonstrated to those who have most closely followed its progress that the maintenance of this bureau is of vital importance to the shipping interests of the city. . . . Assuming that the interests of the shipper and carrier are mutual, and that their relations are as harmonious as the ordinary relations between buyer and seller, the advantages which accrue to either will bear proportion to the alertness and skill with which each interest is guarded. Carriers find profit in organization, in the exercise of vigilance, and in the employment of expert service. The adoption by shippers of similar methods to promote efficiency in guarding their interests does not of necessity embody any element of hostility toward the railroads, but tends rather to subject all questions of difference to patient, thoughtful investigation, and by conference to evolve and establish relative rights. To each subscriber is available the service of the bureau's employees, who by devoting their time exclusively to

fireman on the Great Northern of Ireland committed suicide and the jury censured the road for requiring men to work excessive hours; and so General Hutchinson made an investigation. The evidence showed that of 30 enginemen and firemen running out of Dublin, nearly every one worked from 12½ to 15 hours on more than half the week days for a fortnight (and in some cases men worked 16, 18 and 19 hours in a day); and so the Board requests, in the language of the law, that the company will within one month "submit such a schedule of time for the duty of the drivers and firemen stationed in Dublin as will bring their actual hours of work within reasonable limits;" and the company must report the hours worked by *all* its enginemen and firemen for the overnight ended Dec. 9.

#### Railroad Matters in Chicago.

**Freight Traffic.**—Although traffic on the western divisions of a number of the granger roads was curtailed by snow blockades the greater part of the past week, the general aggregate of freight was in most cases above anticipations, outward traffic from Chicago, being close up to the corresponding time last year, when it was considered very large. Inbound grain and other produce traffic continues materially above anticipations. The deliveries by 11 western lines for the past week aggregated 3,671,000 bushels grain, against 2,453,000 the same time last year, and 4,005,000 in 1892. The movement of other produce was likewise on a liberal scale, and above the average in recent years. The reports from other Western markets where Chicago lines have important terminals, also show free grain deliveries, and it is said that the recent failure of the Chicago, Burlington & Quincy to keep its long established position as the largest deliverer of grain in Chicago was mainly due to the fact that it is carrying enormous quantities of corn to Peoria. Advices from the Northwestern lumber sections report increased shipments direct from the mills to Western and Southwestern consuming points. A considerable amount of this traffic will be diverted from Chicago, by dealers here who will find it more advantageous to make direct shipments by rail from the mills to Western points. The reviving activity in manufacturing at interior points is giving the Illinois, Iowa and Wisconsin lines a better local business.

The following shows the deliveries of grain (bushels) at Chicago by the leading Western railroads for the week ending March 24, and comparisons with the two preceding years:

|                 | 1891.     | 1893.     | 1892.     |
|-----------------|-----------|-----------|-----------|
| C. & N. West    | 1,235,000 | 436,000   | 500,000   |
| Ill. Cent.      | 359,000   | 167,000   | 456,000   |
| C. R. I. & P.   | 467,000   | 63,000    | 537,000   |
| C. B. & Quincy  | 438,000   | 876,000   | 886,000   |
| C. & Alton      | 94,000    | 41,000    | 178,000   |
| C. E. & Ill.    | 22,000    | 99,000    | 91,000    |
| C. M. & St. P.  | 633,000   | 334,000   | 746,000   |
| Wabash          | 105,000   | 38,000    | 90,000    |
| C. & G. W.      | 150,000   | 177,000   | 21,000    |
| A. T. & St. Fe. | 167,000   | 221,000   | 299,000   |
| L. N. A. & C.   | 1,000     | 1,000     | 1,000     |
| Totals....      | 3,671,000 | 2,453,000 | 4,005,000 |

The deliveries of flour (barrels) at Chicago by the leading Western railroads for the week ending March 24 and the corresponding time the two preceding years compare as follows:

|                 | 1891.   | 1893.   | 1892.   |
|-----------------|---------|---------|---------|
| C. & N. W.      | 23,461  | 32,378  | 32,775  |
| Ill. Cent.      | 750     | 1,100   | 630     |
| C. R. I. & P.   | 9,250   | 12,512  | 2,625   |
| C. B. & Q.      | 6,613   | 796     | 13,749  |
| C. & Alton      | 900     | —       | 1,950   |
| C. E. & Ill.    | 450     | 33,050  | —       |
| C. M. & St. P.  | 32,575  | 1,030   | 22,175  |
| Wabash          | 600     | 8,082   | 985     |
| C. & G. W.      | 52,499  | 600     | 27,395  |
| A. T. & St. Fe. | —       | 929     | —       |
| L. N. A. & C.   | —       | 741     | —       |
| Totals....      | 127,098 | 101,231 | 102,284 |

**Passenger Traffic.**—The announcement of a truce in the rate war between the Atchison, Topeka & Santa Fe, and the Southern Pacific, accompanied by the statement that the rates to California would be restored to full tariff figures April 1, induced many to hasten their movements, and travel in that direction was materially enlarged. The Santa Fe from its advantageous position derived the greatest benefits, and the officials claim a large increase. The lines having Texas connections with the Southern Pacific also reported a fair business, but those mainly dependent on the Union Pacific for Pacific Coast connections were less fortunate because of the severe snowdrifts on that line. Other traffic on the lines west of the Missouri was also materially affected by the blizzard, as many trains were greatly delayed and some abandoned, the greater part of the week. The Burlington was also a severe sufferer, but the chief trouble was on its branches in Nebraska and Southern Dakota, on which traffic is not large at this season.

**Operating Expenses.**—Interviews with leading managers disclose that despite the improved outlook they are inclined to take very conservative views regarding the future, and without exception they are as pronounced in their determination to keep expenses down to figures which will correspond with earnings, as at any time since the close of the World's Fair. The General Manager of one of the Western lines said: "The sentiment of the officials of all the lines is to curtail ex-

penses wherever it can be done without injury to the efficient operations of the roads. No superfluous train hands are retained. We feel that we are under less obligations to carry a contingent force because of the unwillingness of employees to accept a reduction of wages, and the arrogance with which they insist that many of their absurd rules shall be observed. A like feeling prevails regarding employees in all other departments of the railroad service. If employees were willing to share the loss of business by accepting a fair reduction in wages, we would feel inclined to carry a larger number on our payroll, despite the fact that business was not such as to require full service; but as they fail to appreciate the situation, knowing all the facts as they do, we feel absolved from all obligations to retain a greater force than the necessities of our work demand."

CHICAGO, March 26, 1894.

#### Foreign Railroad Notes.

The French farmer seems to be on top. Not to speak of an enormous duty on grain, which enables him to get higher prices than elsewhere in the world, though (and because) he cannot supply enough for the national consumption, he compels the railroads to abandon traffic which apparently favors importations of grain, though really it only enables French railroads to get a share of a business which otherwise would enter by foreign ports and be carried partly by foreign lines. About 100,000 tons of imported grain, yearly, go to places on the lines of the Eastern Railroad. Until February of last year, such of it as was imported at Antwerp was carried over Belgian railroads most of the way, to Nancy, in France, 237 miles, for 15.12 francs per ton, and by canal for 11 francs or less; it might be imported by the French port of Dunkirk, whence two French railroads have a route 288 miles long to Nancy, by which the regular grain rate was 19.05 francs per ton, and which consequently carried no imported grain in competition with the Antwerp line. To get a share of this business the French railroads proposed a rate of 15.45 francs from Dunkirk to Nancy, which, though opposed by the Minister of Agriculture at the time, was approved by the National Railroad Council (representing the public interests) and the Minister of Public Works, the approval of the latter making it legal. The rate was bitterly attacked in the French parliament as bad for the French farmer, and a new Minister of Public Works has disapproved it, which makes it necessary to withdraw the rate within a year; when, of course, the grain will come in all the same, but by the Belgian railroads and the canals, instead of the French railroads. It is fair to say, however, that one argument against the rate was its bad effect on the traffic of the canals (partly French), and it was seriously urged that the canals near the border should be particularly protected because of the service they might render in case of war. A force of French soldiers on a fleet of canal boats driving the Uhlan out of France would be a sight to see, and we recommend it as a subject for detaille.

The six great railroad companies of France, working together 19,934 miles of railroad, and having 9,051 locomotives, 21,565 passenger cars and 244,392 freight cars, with a capital of \$2,471,721,306, or \$124,000 per mile, earned in 1892 \$214,561,777, or \$10,693 per mile, which was 0.55 per cent. less than the year before. The passenger trains earned a trifle less than 40 per cent. of the total earnings, and 1½ per cent. more than in 1891, while there was a decrease of 2½ per cent. in freight train earnings. The working expenses were 2½ per cent. more than in 1891 and 53.14 per cent. of the earnings, leaving net \$103,342,362 (\$5,150 per mile), which is 4 per cent. less than in 1893. Their contracts with the State for guaranteed interest made available by the companies \$16,696,790, while the State advances were only \$10,087,761 the year before, and the gross amount of dividends to shareholders was reduced only 1½ per cent. The average dividends paid were 10.1 per cent. in 1892 and 10.35 per cent. in 1891. It must not be supposed from this, however, that the railroad capital in France as a whole yields very large returns. In the first place, more than one-seventh of the amount divided was advanced by the state to pay dividends which it had guaranteed on lines which did not earn them; and, chiefly, only a very small part of the capital of the railroads is represented by shares (11.47 per cent. of it in 1892), and the great bulk of it by bonds, the average interest on which is 4.22 per cent., so that with 5 per cent. earned on the whole capital, after paying prior charges, a surplus would be left equal to 11½ per cent. on the shares. Actually last year the net earnings were 4.06 per cent. on the whole capital. The state guarantees of course make it safe to have so large a proportion of the capital in bonds. In 1884, the first year after the new contract with the six companies, they made a profit of \$5,724 per mile against \$5,044 this year. The companies have been required to build lines which do not pay, and to make various changes in rates, etc., for the benefit of the public; but the state guarantee has caused the cost of these changes to fall upon the public in the form of larger advances to meet guaranteed interest. These advances are debts of the companies which they pay by a share of their profits when these exceed a certain amount. Since 1883 these debts to the State for interest advanced have increased from \$70,487,036 to \$87,184,425. One of the great companies, the Northern, paid off all the state advances

long ago, and makes a profit of nearly 10 per cent. on its whole capital of about \$45,000,000.

In France, you may leave your trunk and other baggage to be stored at the station for 2 cents per piece for the first day and one cent a day thereafter. Some of the railroads complain that this low charge has led people in Paris, where rents are high, to use their baggage rooms for regular storage houses for light and fragile goods. Many wheelmen leave their bicycles at a station and only take them out Sundays, having to pay only seven cents per week, which is a mere fraction of what is charged by those who make a business of storing cycles. On this account the railroad companies have asked the Ministry of Public Works for authority to change the rates on all articles except what is properly personal baggage, and charge two cents for one or two days, four cents for three days, six for four days, and four cents per day for every succeeding day, which would make 18 cents for a whole week, which certainly would not break up the cycle storage business in this country, though it might pay the cost of it. But the government inspecting officers say this would be in conflict with the law, which says expressly that every traveler has a right to offer as baggage what he intends to carry along with him, whatever it may be (which would be an obstacle to discrimination between trunks, etc., and other articles). They think, too, that the misuse of the storage privilege is not a very serious matter; and the National Railroad Council, which is supposed to represent the public interests, agreed with the inspectors; wherefore the Ministry declined to make the change asked for by the railroad, and you may still get your bicycle stored in Paris by a responsible railroad company for seven cents a week. If the French regulations were in force in New York, our railroads would soon be in the market for a block or two of land apiece to put storehouses on.

The Belgian State Railroads had 2,018 miles of road at the end of 1892, 2,001 locomotives, 1,287 tenders, 2,841 passenger cars, 577 baggage cars, 43,710 freight cars, and 916 stations—a station for every 2½ miles. The total number of employees of all grades was 42,881, or 20.5 per mile of road, four times as many as in this country. The train movement was equivalent to 9.74 passenger trains and 7.10 freight trains each way daily, with an average of 7.51 passenger cars and 17.46 freight cars per train. The gross earnings were \$27,402,590, or \$13,579 per mile, of which 33 per cent. was from passengers. The working expenses were 50% per cent. of the receipts, and the net earnings \$11,065,333, or \$5,483 per per mile. The net earnings were about 4 per cent. on the capital invested, and as the government has to pay but 3½ per cent. on its bonds, and on some only 3 per cent., the railroads may be regarded as profitable.

Further progress was made in reducing the Sunday freight train movement. In 1891 out of 1,621 freight trains, 1,442 (89 per cent.) did not run Sunday; in 1892, 1,505 out of 1,639, or 91.7 per cent.

The respectable sum of \$107,776 was received for "platform tickets," that is, tickets which authorize the holder not to ride, but to pass through the station to the platform in front where passengers get off and on the train, to accompany his friends, offer his services, etc.

We are all going to be poisoned now by the deadly passenger car. In the laboratory of the Imperial Board of Health of Germany experiments were made between January, 1891, and July, 1892, by which the seeds of consumption were found in abundance in the dust collected, not only on the floors, but on the walls and seats, of cars. Samples of dust were taken from 45 compartments of 21 different passenger cars and 117 animals were inoculated with them. Part of these died very soon thereafter of various contagious diseases before they had time to develop consumption; of the rest, killed four to six weeks after inoculation, three had tubercles. These three, however, were inoculated with sleeping-car dust, taken not from the floor, but from the walls, cushions and ceilings. Bacteria at the rate of 78,800 per square inch were found on the floor of a fourth-class car, and 34,400, 27,200 and 16,500 per square inch on the floors of the third, second and first class cars. Thus, even in the latter, the average passenger, who usually has at least half a compartment to himself, say 3,000 sq. in. of floor, has an army of 49,500,000 deadly enemies aiming at his vitals on the floor alone, to say nothing of other millions in front and rear, on both flanks and overhead. It would seem impossible to escape; but the Board of Health is said to have reported measures for removing or reducing the danger, which the railroads are considering.

The Prussian State Railroad authorities have been trying some years to limit, so far as possible, freight traffic on Sundays and holidays, that the employees may rest. About 30 per cent. of the freight trains do not now run on these days. In December, 1891, a special commission was appointed to investigate the subject thoroughly and see if it is not possible to suspend freight traffic entirely on Sundays. This commission has examined into the situation on every run and has lately reported that with few exceptions freight trains need not run on any line on Sunday for the greater part of the year. To suspend these Sunday trains throughout the year, including the seasons of active traffic which

occur periodically, would require the expenditure of very considerable sums—for increasing the stock of cars alone more than \$10,000,000; and the commission regards this impracticable at present, but advises a progressive reduction of Sunday train movement for all but the times of heavy traffic, so that the number of employees in freight service who shall have their Sundays increased from 27,039, as at present, to 52,278. Instructions have been given to do this so far as the rolling stock and appliances actually on hand make it possible, and with due regard to the interests of shippers.

The Hungarian State Railroads have been using the Danube to enable them to compete with other transportation routes, and especially with the Austrian railroads. South of the lower course of the Danube and the Save is an immense fertile territory in Servia and Bulgaria, which has little other outlet than the river. These countries are well wooded, and produce for export numbers of hogs and endless quantities of plums (prunes), which the Hungarian State roads had practically no share of, when the late Minister Baross established some steamboat lines and in the last half of 1888 succeeded in getting for his railroad 380 carloads of plums, 215 of hogs and 77 of other freight. The next year more boats were put on, and 1,851 carloads of freight were secured by them. Then the river traffic was thoroughly organized and new routes established and business sought to be carried by rail to the Hungarian port of Fiume, on the Adriatic, for which 1,001 carloads of grain were secured that year, while the total interchange between the river boats and the railroads was 2,783 carloads, besides a good many passengers. In 1891, the railroads having more grain than they could handle, the steamboats brought 881 carloads to Budapest, 2,245 carloads were delivered to the Fiume line, and the whole steamboat business transferred amounted to 4,921 carloads. The next year the fleet of the Austro-Hungarian State Railroad Company was acquired, together with its Hungarian railroad lines, which formerly carried nearly all the through freight between Hungary and Austria, and the traffic went on growing until interrupted by the cholera, in spite of which the freight transferred between boat and rail amounted to 5,308 cars, and the vessels brought 1,401 carloads of grain to Budapest.

At the close of 1892 the State Railroad administration had a fleet of 79 craft of different kinds, which navigated routes on the Save, the Theiss and the Danube of an aggregate length of 1,102 miles, making 142,790 steamer-miles, and carrying 145,521 passengers, 183,400 tons of freight and 1,051 carloads of hogs. The freight transferred to and from the railroads amounted to 5,308 carloads, on which the railroads earned \$180,800. The vessels earned directly \$107,668, and their expenses were \$140,612, or at the rate of \$1.03% per mile sailed, making the cost per ton-mile on the river 1.05 cents. It was not expected that the steamboats would yield a profit from their own earnings, but only by the traffic which they contribute to the railroads, the profit on which much more than makes up for the loss on the vessels. Their receipts, moreover, slightly exceeded their expense in every year except this last—the cholera year. Budapest has been made a great center of the prune trade, an important grain traffic directed to Fiume, and a considerable market secured for some Hungarian productions, especially cement, objects which the state railroads seek to cultivate. All this, it must be remembered, was done in competition with an old steamboat company, which works chiefly to Vienna and the Austrian railroads.

#### TECHNICAL.

##### Manufacturing and Business.

The Cleveland Twist Drill Co. has furnished the fast United States cruiser Columbia with a full complement of twist drills and tools.

The Thomas Oliver Patent Shaft Coupling Co., of Newark, N. J., has been incorporated by Hugh Kinard, Thomas Oliver and Francis J. Meeker, all of Newark, N. J.

The Gagnier-Griffin Suspended Railway Bridge Co., of Chicago, has been incorporated by George Mason, G. H. Griffin, James O. Baird, J. S. Chadwick, Barney J. Gagnier and J. S. Wilkin.

J. Dixey has resigned as Manager of the Hovey & McCracken Car Co., of Muskegon, Mich. The shops have been closed for some time, but it is reported that they will be opened again soon.

The Alexander car replacer, invented by W. E. Alexander, of Forest City, Pa., will be manufactured in Oswego, N. Y., by a stock company of Oswego, Carbondale and Scranton business men.

Increase of business at the Ingersoll-Sergeant works, Oldenweldertown, Pa., has necessitated the erection of another building 160 ft. long and as wide as the present main structure. Work will begin at once.

The Lodge & Davis Machine Tool Co., of Cincinnati, O., has just received orders from Valencia, Venezuela, South America, for several of its machine tools, including one large lathe 21 ft. in length, and for an improved shaper.

Westinghouse, Church, Kerr & Co. have removed their offices from 17 Cortlandt street, New York, where they have been established since the firm was organized,

about ten years ago, to the Havemeyer Building, 26 Cortlandt street.

Frank G. Kammerer, Receiver of the Hinson Car Coupler & Manufacturing Co., of Chicago, announces that he will make application in the Superior Court at Chicago, on April 2, for an order to sell the entire property of the company and to close up its business and the receivership.

At the annual meeting of the O'Neil Highway Crossing Alarm Co., held at Chicago on March 23 last the following were elected directors of the company: W. D. Drake, W. P. Johnson and J. C. O'Neil, of Cleveland; James T. Gardner, of Chicago; and A. L. Dunbar, of Meadville, Pa.

The Adamson Spring Bottom Platform Manufacturing Co. has been formed for the manufacture of Adamson spring bottom platforms for freight cars. The incorporators are Andrew J. Adamson, William B. Adamson, Michael D. Begley and Rufus Cope, the latter's address being 615 Ashland Block, Chicago.

The Peckham Motor Truck & Wheel Mfg. Co., of Kingston, N. Y., is busy filling an order for 50 14-ft. trucks for a railroad in Cincinnati, O., and has recently constructed one 14-ft. truck, three 20-ft. open car trucks for the Kingston City Railroad, and six 13-ft. trucks for the Colonial City Electric Railroad, of Kingston.

The Kilbourne & Jacobs Manufacturing Co., of Columbus, O., the extensive manufacturers of wheelbarrows and railroad contractors' implements, have been operating their works on eight hours time continuously since last May and without any reduction in wages. The shops are now being operated to their full capacity.

The Detrick & Harvey Machine Co., of Baltimore, has recently purchased from the Capitol Manufacturing Co., of Chicago, the rights of manufacture of the well-known Adams bolt threading and Cook nut tapping machines. The Detrick & Harvey Machine Co. has an excellent plant, and, with the increased facilities of special machinery, is prepared to turn out machines of the highest grade of workmanship.

The Penn Bridge Co., of Beaver Falls, Pa., has now on hand a number of large and important contracts for ironwork for buildings, as well as bridge contracts. The company is to build the three new buildings of the Pittsburgh Reduction Co., at Niagara Falls, N. Y., as recently noted, and in addition has contracts for the boiler-house for the Ohio Steel Co., at Youngstown, O.; for the gas-house of the Johnson Steel Works, at Johnstown, Pa., and for the steel roof trusses for the plant of the Garland Chain Co., at Rankin, Pa. The bridge contracts include a structure at St. Cloud, Minn., with three spans 180 ft. and two smaller spans; for a bridge across the Brazos River at Richmond, Tex., with one 200 ft. span and two 100 ft. spans and also with a 100 ft. span bridge at Scranton, Pa.

It is said that the principal makers of varnish for railroad work are taking an interest in sand-papering machines and are advocating the use of them, finding that better final finish, and thereby a better record for their product, is thus obtained. The "New Conqueror Sander," made by J. E. Fay & Co., is one of the best known machines.

##### New Stations and Shops.

The erection of the Union Depot for the Seaboard Air Line in Portsmouth, Va., will be commenced in April. A much larger building will be erected than was first contemplated, as all the offices of the company will be located in the building.

Ground has been broken at Trinidad for an addition to the Union Pacific, Denver & Gulf shops. Five additional stalls to the round house and new equipment in the machine shops will be added.

The Schenectady Locomotive Works are replacing their old machine shop with a new two story structure built of steel frame work and brick filling. The new building will be 80 ft. x 363 ft. The first floor will have two Sellers' electric cranes, traveling the entire length of the building, and covering all the heavy tools used on locomotive frames and driving wheels. The Phoenix Iron Co., of Philadelphia, has the contract for the steel frame work of the building, while the masonry is being done by a local builder. The B. F. Sturtevant Co., of Boston, is furnishing its blower system of steam heating which is used with success in other departments of the works. The old machine shop, now demolished, was built in 1866, replacing a structure which at that time was destroyed by fire.

The machine tools have been temporarily transferred to other buildings, and set up so that there will be no delay in filling orders during the construction of the building. It is expected that the new building will be completed in June. With the completion of this building, these works will be one of the most modern in buildings and equipment in this country, the entire plant having been practically rebuilt and equipped with new tools during the past ten or twelve years. The works are also about to receive a large hydraulic flanging plant for flanging boiler works, which is about completed by the Morgan Engineering Co., of Alliance, O., which is believed to be the largest and most modern plant of its kind ever constructed for this purpose.

##### Iron and Steel.

Work has been started on the new 26-in. blooming mill of the Carnegie Steel Co., Limited. MacIntosh

Hemphill & Co., of Pittsburgh, have the contract for this mill, which is to take the place of the blooming mill built years ago when the plant was operated by the Allegheny Bessemer Steel Co. The 32-in. mill at the Duquesne Steel Works is to be replaced by a 38-in. blooming mill.

The negotiations which have been carried on since December for the formation of a company to place the steel casting companies under one management have been concluded by the formation of the American Steel Casting Co., which has a New Jersey charter and a capital stock of \$4,200,000. Few details of the organization have been published. The plants included in the new company are the Norristown Steel Co., the Sharon Steel Casting Co., of Sharon, Pa.; the Solid Steel Casting Co., of Alliance, O.; the Standard Steel Casting Co., of Chester, Pa.; the Syracuse Steel Foundry Co., of Syracuse, N. Y.; and the Pittsburgh Steel Casting Co., of Pittsburgh, only a majority interest in the latter having been purchased, however. The main office of the American Steel Casting Co. will be at Chester, Pa., where the Secretary, Augustus Trump, of Pittsburgh, and the Treasurer, S. H. Williams, are to be located. The management of the company will be vested in an Executive Committee consisting of the President, Joseph H. Bohl, of Alliance, O.; the Vice-President, Daniel Eagan, of Sharon; and Frederick Frazer, of Syracuse. The directors of the company are Joseph H. Bohl, President of the Solid Company; Daniel Eagan, President of the Sharon Steel Casting Co.; Frederick Frazer, President of the Syracuse Steel Foundry Co.; Augustus Trump, Secretary and Treasurer of the Pittsburgh Steel Casting Co.; George J. Humbert, Manager of the Norristown Steel Co.; Henry Weston, of 31 Nassau street, New York, and Charles N. King, of Jersey City. The purchase of the various plants was made by the stockholders agreeing to exchange their stock for that of the new company, excepting the Standard, of Chester, which was purchased outright, the owners to receive bonds for the purchase money. The issue of bonds by the new company is limited to \$700,000.

##### Bidding at the St. Mary's Falls Canals.

General O. M. Poe lately secured bids for excavating 25,950 cu. yds. of earth and 4,540 cu. yds. of rock, and framing 40,000 cu. ft. of timber for cribs, with 5,500 cu. yds. of filling for the same. The lowest bid for the excavation was made by Simon Dumond, of Sault Ste. Marie, at 45 cents per cu. yd. for earth and \$1.25 per cu. yd. for rock, making a total bid of \$19,125.50 on the estimated amount of materials. The highest bid was \$33,339.15, and the average of six bids was \$25,347.76. The framing and filling cribs went to Mr. Dumond also. The framing at 6½ cents per cu. ft. and the filling at 40 cents per cu. yd., making a total of \$4,800, the highest bid was \$8,000, and the average of eight bids was \$6,354.

##### The Lake Superior-Mississippi Canal.

The very ancient project to connect the headwaters of the Mississippi with Lake Superior is up again. It is stated that a bill has been brought before the House Committee on Rivers and Harbors appropriating \$10,000 for a preliminary survey. Various commercial and municipal bodies in the Northwest are pushing this.

##### Interlocking.

The Hall Signal Co., for the Johnson Railroad Signal Co., has closed a contract with the Delaware, Lackawanna & Western Railroad for Johnson interlocking apparatus at the following points: Bergen tunnel, west end; Susquehanna crossing; Hackensack draw, main line; Hackensack draw, Boonton branch; Passaic draw, main line; Passaic draw, Boonton branch; Roseville Junction; Passaic and Delaware Junction; Paterson Branch Junction; Denville crossing; East Dover Junction; Dover draw and Chester Junction. This covers every junction, drawbridge and railroad crossing on the Morris & Essex and Boonton branch divisions of the Delaware, Lackawanna & Western.

##### Halsted Street Lift Bridge, Chicago.

The Halsted street lift bridge over the Chicago River, a description of which was given in the *Railroad Gazette* of Feb. 24, 1893, was recently completed and put in use last week. This bridge is of an unusual type, a departure from the ordinary design of drawbridge having been made necessary by the conditions at this point—the river being narrow and cutting the street obliquely and dock property near by too valuable to make it feasible to put in a bridge with a long draw. The bridge just finished provides a channel of 130 ft. and a clearance above the river level of 155 ft. The bridge is so arranged as to be elevated between two towers about 175 ft. in height at a speed of 2 ft. per second, the maximum change of elevation being 142.5 ft. This bridge was designed by Mr. J. A. L. Waddell and was built by the Pittsburgh Bridge Company.

##### Block Signaling.

The Hall Signal Co. has just closed a contract with the Delaware & Hudson Canal Co. to signal its tracks from Albany to Saratoga. The Hall automatic electric rail circuit normal danger system will be used. The average length of the blocks will be 5,558 ft. and no distant signals will be put in. All switches will be protected. The total length is about 39 miles, of which all but 5 miles is double track.

## THE SCRAP HEAP.

## Notes.

The Union Pacific has leased all its hotels and eating-houses to Mr. J. E. Markel.

Two clerks in the general office of the Southern Pacific and two ticket brokers have been arrested at San Francisco for reselling tickets that have been punched.

The fire which burned down the Union passenger station in Denver a week ago is reported to have started from an electric-light wire which was fused by an excessive current.

The Erie laid off a considerable number of freight train crews last week. It is reported from San Francisco that the Southern Pacific has discharged a large number of general office clerks and trainmen.

A Division Superintendent of the Missouri, Kansas & Texas has issued an order that the practice of re-employing men who have been discharged for drunkenness, and have afterward taken the "gold cure," which has been in vogue for a year or two, must be stopped.

The Chicago & Eastern Illinois has notified some of its employees of a reduction of 10 per cent. in wages to take effect April 19, and the notice contains a paragraph to the effect that employees who do not before April 5 signify their intention to stay will be considered as having resigned.

Receiver Clark, of the Union Pacific, has held conferences with employees about wages during the past ten days, the results of which are variously reported. No definite results appear except that the leaders of the Telegraph Operators' Brotherhood report that they have come to an agreement with Mr. Clark. The hearing on the wages question before Judges Caldwell, Sanborn, Riber and Hallett was begun at Omaha this week.

The track of the St. Louis, Iron Mountain & Southern was much damaged by high water in Arkansas last week and traffic over considerable sections of the road was suspended for three or four days. Other roads also suffered. The rainfall at Memphis in four days was 7½ in. and at Texarkana the Red River rose 22 ft. A severe and widespread snowstorm stopped railroad traffic in Nebraska, Wyoming and South Dakota on Thursday of last week. Large numbers of cattle perished in the storm. The damage to the Union Pacific in Idaho, reported last week, was serious throughout a length of 35 miles. Ten bridges were washed away between Mountain Home and Caldwell, and traffic was suspended for about a week.

The "industrial army" from California under "General" Fry, which is a gang of tramps of various degrees of respectability, and more or less organized, reached El Paso, Tex., last week. Press dispatches reported the number of men in the army as 800 or 900. The municipal authorities at the principal towns on the route took various ways of dealing with the vagrants. At one place the leader was arrested. Near Finlay, an uninhabited place on the El Paso Division of the Southern Pacific, the army took possession of a freight train, and at last accounts the Superintendent of the railroad was holding the train on the side track in order to starve out the tramps. Sixty-three tramps passed through Rockdale, Tex., on Sunday last, in a box car, bound, they said, for Washington City.

## South American Notes.

The extension of the Northeastern Argentine Railroad, from Monte Caseros to Paso de los Libres, has been finished.

The operations of the Chilean state railroads for the eight months, from January to August, 1893, yielded a gross income of \$8,594,997. The expenses amounted to \$6,186,588, thus leaving a net return of \$2,408,409.

It is stated that an American company has purchased for \$10,000 the concession for an electric railroad between Santiago and Victoria, Chili, which had been obtained by Srs. Enrique Vergara Montt and Santiago Ossa.

Additional decrees have been issued regulating port and wharf dues. Vessels of over 100 tons are to pay 13 cents daily for each 10 of the first 100 tons, and 7 cents daily for each 12 tons over 100. This applies also to the Riachuelo and Madero ports.

The report of work done in dredging the port of Bueños Ayres in the last quarter of 1893 shows an extraction of 169,564 cubic metres of silt. Considerable additions were also made to the retaining walls. The total expenditures for the quarter were \$774,794 gold.

The sum of \$2,000,000 gold having been appropriated by the Argentine Congress on account of railroad guarantees in that republic, pro rata payments of such guarantees will at once be made. The government signifies its intention of paying all arrears as rapidly as possible.

## Spanish Railroad Notes.

Plans have been perfected for a new railroad from Valencia to Segorbe, passing through the towns of Serra and Náguera.

Don Juan Isla has applied for concessions for two new lines in the province of Valencia, one from Carlet to Villanueva de Castellón, and the other a branch from Alberique to Enguera.

The gross receipts of the Spanish railroads, aggregating 5,540 miles of track, for the first two months of the current year amounted to \$4,785,460, against \$4,969,712 for the corresponding period of 1893.

The concessionaires of the proposed Calatayud & Teruel y Sagunto Railroad have applied for an extension of their concession, technically ignoring the action of the government in canceling the original concessions. An enormous subvention had been granted by these concessions, and the government is indignant that it should have been trifled with in the construction of this line, the concessionaires having done ab-

solutely nothing up to date. An Anglo-Belgian company owned the concessions.

## Shipbuilding and Car Ferries on the Lakes.

We mentioned last week the launch by the Detroit Dry Dock Company of the Harvey H. Brown, which is expected to carry about 5,000 tons in a 20-ft. channel.

A contract is being negotiated with the Cleveland Shipbuilding Company for a steel steamer, 345 ft. over all, 42 ft. beam, with a molded depth of 26 ft. 3 in., with gangways for package freight. It is said that on account of the present low cost of labor and material the price will be between \$40,000 and \$50,000 less than if built to the same specifications last spring.

The performance of the car ferries running between Frankfort and Keweenaw has been very satisfactory through the past two winters. The two boats are excellent ice breakers, and there is no trouble in keeping the cars in place in the roughest weather. Lately one of the boats left Keweenaw in what was said to be one of the worst storms of the winter and made Frankfort with a full load of cars in four hours. The distance is 65 miles. It is now said that the Toledo, Ann Arbor & North Michigan Railroad Company, which operates the car ferries, proposes taking one of the boats off the Keweenaw route and putting it on the service to the mouth of the Menominee River on Green Bay. This will give them a great deal of lumber for the Eastern market, besides the freights.

The Pittsburgh, Shenango & Lake Erie Railroad Company is extending its dock at Conneaut. When the dock is completed it is to be 1,700 ft. long and 330 ft. deep. The company is now asking estimates for the construction of several boats for the transportation of cars of coal between Conneaut and Dover. The same boats will draw about 10 ft. of water, and will have a capacity of 22 cars; the consorts will have a capacity of 26. The car ferries are expected to be built and running in about four months. They will carry coal to Canada, and bring truck, lumber, etc.

## Viaduct Damages in Chicago.

The Chicago city authorities have prepared a list of the sums said to be due the city from various railroads, and announce that suits will be pushed to enforce the payment of the claims. It is said that a large part of the present liabilities of the city consists in judgments for damages recovered by property owners in consequence of the erection of viaducts over the tracks of various railroads, and that there is now due from the railroads, by the terms of their ordinances or other contracts, the sum of \$382,863. Of the original sum due from the railroads, about \$645,454, the sum of \$262,591 has already been paid. The sum now in dispute represents the unpaid judgments due to the construction of 11 different viaducts. Of the 14 viaducts mentioned in the bill of particulars, all judgments have been paid on but three. The roads against which the amount said to be due is assessed number 15.

## Chicago Main Drainage.

The Commissioners of the Chicago Drainage Canal have given Agnew & Co. 10 days' time to show them selves capable of more expeditious work than they have done up to the present. This firm now has but one of the five sections originally awarded it, and this would have been forfeited but for the fact that considerable money had been spent in providing an equipment. The chief engineer is now preparing specifications for the reletting of Section 6, which recently lapsed back to the Board.

## The "Northwest."

The "Northwest," of the Northern Steamship Line, is expected to leave Buffalo on its first trip on Tuesday, June 5, at 7 p. m. It is to stop three hours at Cleveland, leaving here at 8 a. m.; an hour at Detroit, leaving there at 3 p. m.; to leave the "Soo" on Thursday at noon, and reaching Duluth at 8 a. m. Friday. The return trip commences 4 p. m. Friday, reaching Buffalo, with the same stops *en route*, Monday at 6 a. m. This schedule allows running both rivers by daylight. The fare between Buffalo and Duluth is to be \$17, or \$30 for a round trip, exclusive of staterooms. The meals are to be served *à la carte*. The "North Land," a sister boat, is to be launched at the Globe shipyard on May 3, and, it is hoped, will go into commission in August. The service is to be closed for the season on Oct. 15.

## Certain Chicago Tracks.

It is reported that action will be taken to compel the Union Stock Yards & Transit Co., of Chicago, to remove its tracks on Forieth street. The tracks pass through a choice residence locality, and the property owners object seriously to the operation of the line as conducted at present, claiming that the transfer of live stock and other freight is a public nuisance, that the company has violated its charter in various ways, and that the necessity for the line no longer exists, as other facilities for the transfer of freight have been provided. Steps are to be taken which will compel the company to show its authority for occupying the street.

## An Incident in Pennsylvania.

A cave in at the Indian Ridge colliery, near Shenandoah, March 27, caused the sinking of both the east and west bound main tracks of the Lehigh Valley Railroad, cutting off all traffic between that place and Delano and also carrying down a track to the south used for coal traffic by the Philadelphia & Reading. The break in the surface extended 450 feet north and south and 600 feet east and west. The Lehigh tracks went down six feet and the Reading tracks dropped 12 feet, carrying two large coal cars with it. A woman who was walking on one of the tracks when the cave in occurred held onto the suspended rails and escaped injury. The trains were run up to the ends of the breach and the passengers walked around it.

It is thought that the cave-in will be more extensive, as the main chambers are still working and it may be several days before the tracks will be in good shape again.

## LOCOMOTIVE BUILDING.

Ten Class P locomotives are being built at the Juniata shops of the Pennsylvania, and five of the same class at the Altoona shops.

## CAR BUILDING.

The International Fruit Dispatch Co. has given an order to the Missouri Car & Foundry Co., of St. Louis, for 100 cars.

The West End Street Railway, in Boston, has closed a contract with the Westinghouse Electric Manufacturing

Company for 150 car equipments positively, and 50 additional if needed.

The contract of the Haskell & Barker Car Co., of Michigan City, Ind., for 1,500 cars, reported last week, includes an order for 1,000 cars from the Great Northern and for 500 cars from the Louisville, New Albany & Chicago.

The reports printed two weeks ago, that the Cleveland, Lorain & Wheeling and the Delaware & Hudson company were asking bids for building freight cars, was erroneous in regard to both companies. We regret that the items should have been printed. They were published on what we believed to be authoritative information, which in this case turns out to have been misinformation.

## BRIDGE BUILDING.

**Albany, N. Y.**—A bill has been prepared authorizing the New York Central & Hudson River Railroad to build a pile bridge over the Albany basin in the city of Albany. The bridge is to have a draw to admit of the passage of canal boats.

**Berlin Bridge Co.**—The Berlin Iron Bridge Co. is doing considerable iron bridge work at the present time. Among other contracts it has 17 signal bridges for the Boston & Maine Railroad; two bridges, 200 ft. long, for the town of Roxbury, Conn.; a bridge 400 ft. long across the Connecticut River at Stratford, N. H.; a bridge 350 ft. long at Turner, Me.; a bridge 200 ft. long at Houlton, Me., and a bridge 200 ft. long at Moosup, Conn.

**Chicago.**—The new lift bridge on South Halsted street has been completed and is now ready for use. Commissioner of Public Works Jones and City Engineer Artingstall formally inspected the structure last week. The bridge was designed by J. L. A. Waddell, of Kansas City, whose plans were approved by ex-Commissioner of Public Works Aldrich. Commissioner Aldrich was confronted by a difficulty when the United States forbade a swing bridge of the ordinary type across the river at Halsted street. It was claimed that the channel was too narrow to permit of a pier. When Mr. Waddell's idea was suggested Commissioner Aldrich secured favorable action regarding it. The bridge has already been described in these columns. The towers are 191 ft. high from the level of the river, and there is a clearance of 155 ft. when the bridge is lifted.

**Fowler, Tex.**—The Texas Central Railroad Company has contracted with the Union Bridge Company, of Buffalo, for the erection of a 165-ft. span steel bridge across East Steel's Creek near Fowler Station, in Bosque County, Tex.

**Glenwood, Pa.**—The bill authorizing construction of a bridge across the Monongahela River at Glenwood was amended by the United States Senate to provide that the channel span should not be less than 500 ft. long in the clear, nor less than 53 ft. high.

The bill authorizing the Glenwood Bridge Company to construct a bridge across the Monongahela River at Glenwood has passed both branches of Congress without amendment.

**Kamloops, B. C.**—H. B. Smith, C. E., has completed the survey for the proposed bridge over Thompson River.

**Milton, Pa.**—The contract was awarded March 19 to the King Iron Bridge Co., of Cleveland, O., at its bid of \$67,500 for an iron structure. Of the 133 bids by 33 different firms the lowest for a wooden structure was \$64,400, and the iron bids ranged from \$48,000 to \$108,000.

**Morrellville, Pa.**—A new petition to the Pennsylvania officials asking for overhead bridges at the Bream and Heider crossings has been prepared.

**New York, New Haven & Hartford.**—This company has contracted with the R. F. Hawkins Iron Works, of Springfield, Mass., for four iron bridges for its main line to be built at once at a cost of about \$20,000.

**Ottawa, Ont.**—The City Council has voted the sum of \$150,000 to help in building the new steel bridge over the Ottawa River, at Nepean Point.

**Philadelphia.**—A subcommittee of the City Council's Committee on Surveys met at the office of the Director of Public Works last week and agreed to report an ordinance appropriating the money available for bridges to the main committee. It sets aside \$300,000 for a new Schuylkill Falls bridge, \$28,000 for a new bridge to carry Girard avenue over the Philadelphia & Reading Railroad at Thirty first street, \$25,000 for a new bridge at Forty-ninth street, over the West Chester branch of the Pennsylvania Railroad; \$50,000 to carry Seventeenth street under the connecting railroad, near Lehigh avenue; \$50,000 for a bridge at Wayne and Duval streets, Germantown; \$80,000 for a bridge at Sixth street and Allegheny avenue; \$60,000 for a bridge over the Pennypack Creek, at Torresdale avenue, in the Thirty-fifth Ward; \$15,000 to carry Torresdale avenue under the Bustleton Railroad; \$25,000 for a bridge over Frankford Creek, at Bridge street; \$70,000 for a bridge at Sixty-third street, over the P. W. & B. Railroad and over the connecting railroad at Thirty-third street; and \$50,000 for a bridge over Frankford Creek at Wyoming avenue. These figures are subject to change by the main committee. The total amount of the appropriation for bridge work is \$840,000.

Plans are being prepared by the engineering department of the Philadelphia & Reading Railroad for a new seven-track bridge over Wayne avenue in Philadelphia.

**Pittsburgh, Pa.**—The Kensington Rapid Transit Bridge Company was chartered at Harrisburg, March 20, with a capitalization of \$20,000, to erect a bridge over the Allegheny River from Ferry street, Creighton, to New Kensington. Directors, Samuel E. Moore, Bernard F. Rafferty, Joseph P. Cappau, Curtis C. Hussey and Gustave Kaufman, Pittsburgh.

**Renfrew, Ont.**—A new iron bridge will be constructed over L. M. Russell's canal. Mr. J. L. Morris, C. E., has been making surveys.

**Revelstoke, B. C.**—Messrs. Duchesnay and Walken, Canadian Pacific engineers, are taking soundings just below here for the proposed steel bridge over the Columbia River, on which work will be commenced in the fall.

**Ste. Cunonde, Que.**—The City Council has decided to build an iron bridge over the Lachine Canal at Atwater avenue.

**St. Hyacinthe, Que.**—Two bridges over the Yamaska River have been condemned and are to be replaced by iron structures.

**Sunbury, Pa.**—A project to build a \$100,000 wagon bridge across the Susquehanna at this point is being talked of at this town.

**Toronto, Ont.**—The plans submitted to the City Engineer by the Grand Trunk Railway for the proposed John Street Bridge to be erected in conjunction with the new Union Station have been approved. The bridge will be constructed of iron and will have six spans, two of which will be 140 ft. and the remainder 100 ft. The roadway will be 30 ft. wide, with a 6-ft. sidewalk on each side.

The plans and specifications for the York Street Bridge have been handed to the City Engineer by the Canadian Pacific Railroad.

**Upper Marlboro, Md.**—The Senate Committee on the District of Columbia has been urged to authorize the construction of a bridge from South Capitol street to a point near Poplar Landing, in close connection with Anacostia.

**Winnipeg, Man.**—The Board of Works has recommended that tenders be called for the iron superstructure of the Boundary Street Bridge; estimated cost \$22,000.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

**Chicago, Rock Island & Pacific**, quarterly, 1 per cent., payable April 10.

**Concord & Montreal**, \$1.50 per share, payable May 1, to holders of stock of classes 1, 2, 3 and 4.

**Norfolk & Southern**, quarterly, 1 per cent., payable April 10.

**Peterborough**, semi-annual, 2 per cent., payable April 2.

##### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

**Canadian Pacific**, annual, Montreal, Quebec, April 4. **Chesapeake, Ohio & Southwestern**, annual, Memphis, Tenn., April 2.

**Chicago & Alton**, annual, Chicago, Ill., April 2.

**Chicago & Grand Trunk**, annual, Chicago, April 11.

**Cincinnati, Saginaw & Mackinaw**, annual, Saginaw, Mich., April 17.

**Grand River Valley**, Jackson, Mich., April 25.

**Harlem River & Port Chester**, annual, New York City, April 14.

**Joliet & Chicago**, annual, Chicago, Ill., April 2.

**New York Central & Hudson River**, annual, Albany, N. Y., April 18.

**Panama**, annual, New York City, April 2.

**Pittsburgh, Cincinnati, Chicago & St. Louis**, annual, Pittsburgh, Pa., April 10.

**Sterling Mountain**, annual, New York City, April 3.

**Toledo, Ann Arbor & North Michigan**, annual, Toledo, O., April 18.

**Union Pacific**, annual, Boston, Mass., April 25.

**Union Pacific, Denver & Gulf**, annual, Denver, Col., April 10.

##### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The **Master Car Builders' Association** will hold its annual convention at Saratoga, N. Y., beginning June 12. The hotel headquarters will be at Congress Hall, H. S. Clements, Manager.

The **Master Mechanics' Association** will hold its annual convention at Saratoga, N. Y., beginning June 18.

The **Association of Air Brake Men** will hold its first annual meeting at Columbus, O., April 10.

The **American Railway Association** will hold its spring meeting in the Hotel Brunswick, Fifth avenue and Twenty-sixth street, New York City, on April 11.

The **National Association of Local Freight Agents** will hold its annual convention at Pittsburgh, Pa., June 12, 13, 14. The headquarters will be at the Monongahela House.

The **New England Railroad Club** meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The **Central Railway Club** meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October.

The **Southern and Southwestern Railway Club** meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November. The next meeting will be on Thursday, April 19, at 10 a. m.

The **American Society of Civil Engineers** meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month at 8 p. m.

The **Canadian Society of Civil Engineers** meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

The **New York Railroad Club** meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The **Northwest Railroad Club** meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month at 8 p. m.

The **Western Railway Club** meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The **Technical Society of the Pacific Coast** meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The **Association of Engineers of Virginia** holds informal meetings the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The **Boston Society of Civil Engineers** meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The **Western Society of Engineers** meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago. The next meeting will be held in the Grand Pacific Hotel, on Wednesday, April 4.

The **Engineers' Club of St. Louis** meets in the Missouri Historical Society Building, corner Sixteenth and Lucas Place, St. Louis, on the first and third Wednesdays in each month.

The **Engineers' Club of Philadelphia** meets at the House of the Club, 112 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The **Engineers' Society of Western Pennsylvania** meets at its rooms in the Thaw Mansion, Fifth street,

Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The **Civil Engineers' Club of Cleveland** meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The **Engineers' Club of Cincinnati** meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 7:30 p. m.

The **Engineers' Club of Kansas City** meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The **Engineering Association of the South** meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The **Denver Society of Civil Engineers** meets at 38 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The **Montana Society of Civil Engineers** meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The **Engineers' Club of Minneapolis** meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The **Northwestern Track and Bridge Association** meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The **Engineers' and Architects' Club of Louisville** meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month at 8 p. m.

The **Civil Engineers' Society of St. Paul** meets on the first Monday of each month.

The **Scandinavian Engineering Society of Chicago** meets in room 300, Title and Trust Building, 100 Washington street, on the third Thursday in each month.

The **Foundrymen's Association** meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

##### General Passenger Agents' Association.

The American Association of General Passenger and Ticket Agents met at Palm Beach, Fla., on March 21. The usual routine business was transacted. The annual address was delivered by Mr. Samuel Powell, of Chicago. Quebec was chosen for the September meeting.

The annual election resulted: For President, J. C. Anderson, New York, Ontario & Western; Vice-President, W. M. Davidson, Plant system; A. J. Smith, of the Lake Shore & Michigan Southern, was re-elected Secretary.

##### American Institute of Electrical Engineers.

The 85th meeting of the American Institute of Electrical Engineers held in New York City, March 21, was practically duplicated at Chicago on the same evening. Considerable interest attaches to the event by reason of its being the first attempt of the kind, and it was successfully carried out on the lines presented by the Secretary of the Institute in a paper read last October, and which was referred to in the *Railroad Gazette* at that time. On this occasion the paper was by Prof. W. A. Anthony, of Vineland, N. J., formerly of Cornell University, and more recently, Consulting Electrician of the Mather Electric Co., at Manchester, Conn. It was "On the Effect of Heavy Gases in the Chamber of an Incandescent Lamp," and was based on comparative tests between the vacuum lamp in general use, and the so-called "Novak" lamp, in which the bulb is filled with bromine gas. Although it was the intention of the author to give the results of what he considered a scientific investigation, the paper was construed as being in reality a comparison of the relative merits of the two lamp, and experts from the Edison Lamp Works at Harrison, N. J., well equipped with diagrams and data of tests of both vacuum and "Novak" lamps, were present at both the New York and Chicago meetings. Prof. Dugald C. Jackson, of the University of Wisconsin, represented the author at Chicago, and advance copies of the paper had been mailed to the entire membership in accordance with the usual practice of the Institute. Through the courtesy of the Chicago, the Long Distance and the Metropolitan Telephone Companies the two meetings were also placed in communication with each other during the entire session. President Houston, who presided in New York, made congratulatory remarks to the Chicago meeting which were listened to through forty receiving telephones which had been provided through the efforts of General Manager Hibbard, who was also Chairman of the Chicago meeting, which was held at the Armour Institute. The discussion of the paper in both cities was unusually full and will be published in the monthly issue of the *Transactions*, on April 18.

##### American Railway Association.

The spring meeting of the American Railway Association will be held at the Hotel Brunswick, New York City, on Wednesday, April 11, at 11 a. m. Reports will be presented by the following committees: Executive Committee, Committee on Train Rules, Committee on Car Service, Committee on Safety Appliances, Joint Committee on Interlocking and Block Signals, and Committee on General Regulations for Employees.

The annual election of officers will take place at this meeting. Two members of the Executive Committee and three members of the Committee on Train Rules will also be elected.

##### Association of American Railway Accounting Officers.

Secretary C. G. Phillips, of 22 Fifth avenue, Chicago, announces that the sixth annual meeting of the Association will be held at Washington, D. C., commencing Wednesday, May 30, at 10 o'clock a. m. The place of meeting has not yet been definitely fixed.

##### Western Society of Engineers.

The next meeting of the Society will be held in Parlor 44, Grand Pacific Hotel, on Wednesday evening, April 4, at 8 p. m. A paper, "Some Notes on the German Collective Exhibit of Engineering at the World's Columbian Exposition," will be presented by Mr. Charles J. Roney.

##### PERSONAL.

—Mr. Robert Walker, formerly Master Car Builder of the Missouri, Kansas & Texas, died in Sedalia, Mo., on March 14, at the age of 52 years.

—Mr. A. T. Dice, formerly Superintendent of Signals of the New York Central & Hudson River Railroad, has been appointed Division Superintendent of the Philadelphia & Reading Railroad, with headquarters at Atlantic City, N. J.

—Mr. Henry D. Laughlin, until recently Vice-President of the National Hollow Brake Beam Co., has been elected President and General Manager of the American Brake Beam Co. Mr. F. B. Aglar, who has been Secretary of the American Brake Beam Co., will, in addition to such duties, be Assistant to the General Manager and in charge of sales.

—Mr. Richard C. Hannah, formerly with the Illinois Steel Co., died at Chicago last week after a brief illness. For more than 20 years he was connected with the North Chicago Rolling Mill Co. as Secretary, and he was the Treasurer and Secretary of the Illinois Steel Co. after the consolidation. He retired from business four years ago. He was 58 years old at the time of his death.

—Mr. H. Waller Brinckerhoff, M. Am. Soc. C. E., has resigned the position of Principal Assistant Engineer of the Metropolitan Traction Company, of New York, which he held during the construction of the Broadway Cable Road, and will resume his practice as consulting civil and mechanical engineer in the office of Major G. W. McNulty, Aldrich Court, 45 Broadway, New York City.

—Col. T. W. M. Draper and a party of engineers who went to the Province of Esmeralda, Ecuador, to examine into and prepare plans for the operation of the Cachiví Company's mining property have returned. Colonel Draper reports that he was very much pleased with the great extent and value of the gold territory on the coast of Ecuador and Columbia. He spent some time on the Isthmus examining the Panama Canal and Railroad.

#### ELECTIONS AND APPOINTMENTS.

**Central Pacific.**—Stephen T. Gage, Mrs. Leland Stanford's representative in the board of directors of the Central Pacific, has resigned, and it is alleged that other directors will retire in April.

**Chicago, St. Louis & Cairo.**—The Directors of this company, chartered at Springfield, March 24, are: George A. Saunders and George E. Ayers, of Springfield; Andrew W. Cross, Morris R. Locke and Prentiss D. Cheney, of Jerseyville; D. H. Donovan, of Chicago, and C. F. Griffith, of St. Louis.

**Cleveland, Cincinnati, Chicago & St. Louis.**—W. S. Moore has been appointed Acting Engineer of Maintenance of Way of the Michigan Division.

**New York & New England.**—The following directors were elected at the adjourned annual meeting of the company in Boston, on March 21: Gordon Abbott, Charles F. Adams 2d, A. S. Bigelow, Francis C. Lowell, A. C. Farrer, S. M. Weld, of Boston; John Kean, Jr., John G. Moore, Thomas C. Platt, Samuel Thomas, Benjamin F. Tracy, of New York; John W. Doane, of Chicago; Spencer Ervin, James F. Sinnott, Arthur Brock, of Philadelphia; M. J. Perry, B. F. Vaughan, of Providence, R. I.; D. S. Plume, of Waterbury, Conn.; and Arthur Sewell, of Bath, Me. The retiring members are President McLeod, Samuel Heilner, Joseph Hensler, Jr., C. E. Gross, F. H. Prince, Charles A. Prince, James Armstrong, H. A. Dupont and C. W. Chapin.

The directors met in Boston on March 27 and re-elected J. T. Odell Vice-President, and adjourned to meet on April 5 at No. 49 Broadway, New York. The other officers will hold over except the President. Vice-President Odell will perform the duties of president, and it is not the intention of the directors to choose a president for some time.

**Pennsylvania.**—The following directors of the company were elected at Philadelphia on March 27: George B. Roberts, Alexander M. Fox, N. Parker Shortridge, Henry D. Welsh, William L. Elkins, H. H. Houston, A. J. Cassatt, C. A. Griscom, B. B. Comegys, Amos R. Little, W. H. Barnes and George Wood.

**Philipburg, Ebensburg & Johnstown.**—The directors of this company organized in Pennsylvania last week, are: S. P. Langdon, President; William P. Davis, William E. Steen, George B. Thatcher, James C. Long, Neil J. McLaughlin and Jeremiah R. Levon, all of Philadelphia.

**Pittsburgh & Eastern.**—The first directors of this Pennsylvania company are S. H. Hicks of Philadelphia, President; directors, W. S. Wallace, Ezra Lukens, W. J. Wagenknecht, Edward Fell Lukens and E. H. Clapp, of Philadelphia, and C. Edward Oram, of Haverford, Pa.

**Seaboard Air Line.**—R. H. Tate has been appointed Southwestern Freight and Passenger Agent, with headquarters at New Orleans. The office is newly created.

**Toledo, Ann Arbor & North Michigan.**—The directors met in New York this week and effected the change of management which has been contemplated since the bankruptcy of last year. James M. Ashley, Sr., James M. Ashley, Jr., Henry W. Ashley and David Robinson, Jr., retired from the Board of Directors. The following board was chosen in their place: Robert M. Gallaway, President of the Merchants' National Bank; Samuel H. Kissam, of Kissam, Whitney & Co., and Charles E. Quincy. A vacancy was left in the board. The board elected Amos F. Eno President and John Jacob Astor Vice-President.

**Union Pacific, Denver & Gulf.**—Frank Semple has been appointed General Passenger and Ticket Agent, with office at Denver. Mr. F. Wild, Jr., who has heretofore been General Freight and Passenger Agent, retains the former position.

**Zanesville Terminal Company.**—At the annual meeting held at Columbus, O., the following directors were elected: D. F. Gray, F. C. Hubbard, George W. Sinks and P. W. Huntington, of Columbus, and Chase Andrews, of Zanesville. The officers elected were: President, D. S. Gray; Secretary, L. W. Neerames; Treasurer, F. W. Prentiss.

#### RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

**Atlantic, Suwannee River & Gulf.**—This railroad is now completed between Starke and La Crosse, Fla., about 20 miles, and the surveys have been made to the Suwannee River, 35 miles west of the present terminus. It is announced that the contract for building the line to the Suwannee River has been recently let to William Varnadoe. Arthur Heigs is the Manager, with office at Jacksonville, and F. J. Morehead, of Ocala, Fla., is the chief Engineer.

**Baltimore & Cumberland.**—The award of the contract for building 80 miles of this railroad between Cumberland and Hagerstown, Md., which is to be made about March 31, has brought nearly 100 contractors from all parts of the country, even further west than Chicago, to the town of Hancock, Md., the headquarters of the Chief Engineer. The representatives of nearly all the large railroad contractors in the country, as well as many of less wide reputation, have gone over the route before submitting bids, and the estimates are likely to be exceedingly low.

**Baltimore & Ohio.**—The House Committee on the District of Columbia gave a hearing last week on the bill directing the Baltimore & Ohio Railroad Company to bring the track of the Metropolitan Branch into the city of Washington, D. C., on an elevated masonry viaduct along Delaware avenue.

**Buffalo & Susquehanna.**—The contract for the 13½-mile extension from Galeton to Ansonia, Pa., will be let in a few days and active operations commenced early in April. C. W. Goodyear, of Buffalo, N. Y., is General Manager.

**Canadian Pacific.**—The agreement between the town of Amherstburg, Ont., and the Canadian Pacific for the extension of the road south about 10 miles to that place, has been accepted by both parties. The line is to be completed by October 1st.

**Central New York & Western.**—Extensions of this road, both north from Wayland and south from Angelica, N. Y., are projected, but as yet no plans have been consummated. Some negotiations with this end in view are now pending, and some work may be done this year, but the question is unsettled. M. S. Blair, of Hornellsville, N. Y., is General Superintendent.

**Chicago & Southeastern (Ind.).**—The work now being done near Anderson, Ind., on the extension of this road to Muncie is under the direction of William Cronin, who has the contract to build the line into Muncie. When the extension is completed and in operation to that town the company will receive \$47,000 in subsidies from Delaware County, Ind., which is traversed by the new line.

**Chicago, St. Louis & Cairo.**—This company has been incorporated at Springfield, Ill., to construct a railroad from Chicago to East St. Louis, thence to Cairo, Alexander county, Ill. The principal office is to be at Springfield. The incorporators are Morris R. Locke, the railroad contractor, P. D. Cheney and A. W. Cross, all of Jerseyville; D. H. Donovan, of Chicago, and George A. Saunders of Springfield.

**Cleveland, Lorain & Wheeling.**—The contracts for the grading and masonry for the new line between Mallet Creek and Cleveland, O., have been awarded to the following contractors, viz.: Sec. 1 to 7 inclusive Werneburg Bros., Pittsburgh, Pa.; Sec. 8 to 24 inclusive, Ferguson Contracting Co., Seymour, Ind.; Sec. 25 to 28, inclusive, A. M. Winsper & Co., Brooklyn Village, O.

The contract of Werneburg Bros. is for the first eight miles out of Cleveland, and the work on this section will be the first to be commenced. The contracts for the iron bridgework on the extension have not yet been awarded, but the plans have been prepared by the Chief Engineer, W. C. Jewett, of Cleveland. The trestlework has been let to T. A. Kearns, of Chicago.

**Cochiti & Albuquerque.**—This new company was incorporated in Denver last week, the promoters being W. R. Barbour, F. W. Moffatt, R. W. Holmes, A. Knaebel and R. W. Warren. The proposed route is from Alamosa, Col., to the Cochiti mining district, in New Mexico.

**Drummond County.**—The extension of this line from St. Leonard Junction northeast to Levis, opposite Quebec, which was begun last summer, is still in progress, and about 20 miles of the line has been finished up to the present time. The distance is about 65 miles to Chaudiere Junction, Levis being about 10 miles farther. There will be several long bridges on this line, one across the Du Chene River, 100 feet long and 150 feet high, and another over the Chaudiere River, 1,300 feet long. The railroad is being constructed by William Mitchell, of Drummondville, Que., the General Manager. J. H. Tessler is Chief Engineer.

**Ebensburg & Black Lick.**—Over 700 men are now engaged on the construction of this branch road and the work is being pushed as rapidly as possible by Contractor McFadden. The work of laying the ties and rails will be commenced in a few weeks, or as soon as the grading in the vicinity of the Twin Rocks and Barker City is completed. The road is a branch of the Pennsylvania and is being built from Ebensburg to Black Lick, Pa., 10 miles.

**Elkton, Massey & Middletown.**—The bill recently passed amending the charter of the old Elkton & Middletown Railroad, and ratifying its claim to the \$58,000 subsidy in Cecil County bonds, has been approved by Governor Brown. The law provides for the transfer of the subsidy, however, to the Elkton & Southern, provided this company does not complete its line to Massey in a stated time. The road is projected in the interest of the Pennsylvania, and Samuel Rea is Vice-President.

**Fairmont, Morgantown & Pittsburgh.**—The long deferred opening of the through line to Pittsburgh is now announced to occur during this week, although regular trains will not be put on before May. The formal inspection of the new line has just been made by General Superintendent Patton, of the Pittsburgh Division, and Mr. W. T. Manning, Chief Engineer, and the road is ready for operation. The new portion is between Morgantown, W. Va., and Smithfield, Pa., and the construction of this 22 miles gives a nearly direct line to Pittsburgh from the coal mines on the West Virginia & Pittsburgh. The construction work has been very difficult and expensive, the portion of the line along Grassy Run, in particular, being through a rugged country. At Point Marion, Pa., the Cheat River is crossed by a bridge with five spans of 150 ft. each, and near Morgan Summit there is a tunnel 450 ft. long.

**Florence & Cripple Creek.**—Twenty miles of rails have been laid north of Florence, Col., and the line was opened for business for that distance this week. Passenger trains will be put on April 1. The line will be completed to the Cripple Creek mines by May 8. Over 1,500 men are employed upon the grade on the hills about the Victor mine. J. F. Collins, of Florence, has been made Superintendent and Charles Ege, of Colorado Springs, Auditor.

**Gainesville, Rocky Point & Micanopy.**—The track-laying on this railroad near Gainesville, Fla., is reported to have been recently commenced. The railroad is to extend to Micanopy, Fla., about 12 miles, and was

graded for six miles out of Gainesville in 1891. J. M. Graham, of Gainesville, is the General Manager.

**Gila Valley, Globe & Northern.**—This company has let the contracts for the grading, track laying and bridging of its road from Bowie, Ariz., to Globe City, Ariz., which is about 130 miles in length, to The Midland Construction Co., whose chief office is at Bowie (Teviston postoffice). The location is made as far as Fort Thomas on the Gila River, a distance of 60 miles from Bowie. The work so far as the line is located is very light, maximum grade one per cent, and maximum curvature six degrees. The grading is completed for about six miles, and it is expected to have the track to Fort Thomas by Sept. 1. Solomonville, Safford, Thatcher and Pima are the principal towns the road will touch. Globe City is a copper mining district of considerable importance. E. A. Cutter, of Bonita, Ariz., is President and A. C. Laird, of Los Angeles, Cal., is Secretary and Treasurer.

**Highland & St. Joseph.**—The proposed branch railroad from the St. Joseph & Grand Island road to Highland, Kan., has been organized under the above name by J. C. Beeler, of the Bank of Highland, and others of that town. The road is to be about seven miles long from the junction with the St. Joseph & Grand Island which will be made at Ryan's Station. The surveys have been made and it is probable that the work will be undertaken at once. Bids for the construction of the railroad have been asked by the projectors.

**Kansas City, Osceola & Southern.**—The recent newspaper reports that it had been decided to build an extension of this line south of Osceola to Greenfield, Mo., are erroneous. Mr. J. S. Josselyn, the General Manager, states that this extension will not be undertaken during the current year. A line from the present southern terminus of the road to Greenfield, Mo., will undoubtedly be built in time, either by this company or other people, in the near future, but nothing has been done to build the road at present.

**Kettle Creek.**—It is reported that this road is to be extended from Cross Forks, Pa., toward the Susquehanna River the coming summer and new coalfields opened. E. Munson, of Williamsport, Pa., is President.

**Lehigh Valley.**—A double track is being laid from Avoca to Everhart Junction. Messrs. McDonald & Sayre have the contract.

**Lumberton & Lumber River.**—On April 23 the people of Lumberton, N. C., are to vote on the issue of \$20,000 in bonds to secure the construction of this road connecting that town with Buie, a station on the Atlantic Coast Line, the distance being 14 miles.

**Manufacturers' Railway Co.**—The incorporation of this company in Ohio on March 24 is reported, the capital stock being \$10,000, but no information as to the directors or the proposed route is given.

**Mount Moosilauke.**—The old scheme of constructing a railroad from Warren Village, in New Hampshire, to the summit of Mount Moosilauke, a distance of 10 miles, has been revived, and an effort is to be made to carry out the project this year.

**New Roads.**—J. H. Drew, of Tampa, Fla., and S. B. Sturdivant are projecting a railroad from Tampa to Clear Water Harbor, Fla. The distance between these two towns by water is very short, but the new railroad will have to take an indirect route around the old Tampa Bay in order to reach Clear Water Harbor, which is on the peninsula forming the western side of Tampa Bay.

George F. Hall, Secretary of the Watervale Manufacturing Co., is interested in a company organized at Watervale, Mich., to construct a standard gauge railroad from Watervale, Benzie County, to connect with the Toledo, Ann Arbor & North Michigan and Manistee & Northeastern Railroads. A portion of the route has been surveyed and some right of way secured.

**Ogden & Brigham City.**—This company has been incorporated in Utah by James P. Sprout, Edward Reed, J. C. McCoy, George F. Phillips and Mark Fletcher, all of Ogden. Mark Fletcher, one of the incorporators of the new company, is the lessee of the Ogden & Hot Springs Railroad, which extends from Ogden northward nine miles to Hot Springs, Brigham City being about 15 miles further north. It is the intention of the incorporators to extend the line to Brigham City. The motive power will be either steam or electricity. The officers of the new company are: James P. Sprout, President; Edward Reed, Vice-President; J. C. McCoy, Treasurer, and George F. Phillips, Secretary. The principal office will be at Ogden.

**Olean, Oswayo & Eastern.**—This railroad is now operating five miles of road between Genesee and Ellensburg, Pa., and recently the contract has been let for completing the line to Oswayo, a distance of 15 miles altogether. H. J. Rumsey, of Ellensburg, Pa., has the contract. The surveys were made last year. The maximum grade on the uncompleted portion of the road will be 90 ft. to the mile. J. B. Rumsey, of Oswayo, Pa., is the President, and S. W. Crittenden, also of Oswayo, is Secretary.

**Pella & New Sharon.**—A survey for this line in Iowa, which is to connect the Iowa Central and Wabash road, is now being made by C. H. Byers, of Oskaloosa, Ia., the Chief Engineer. One line will run from the Iowa Central at Oskaloosa through Pella to the Wabash near Howell, and the second line will be run from New Sharon to the Wabash.

**Pennsylvania.**—The town council of Johnstown, Pa., has given the Pennsylvania right of way over certain public highways and city land, for a branch of that road to the Johnson Steel Works.

Bids were opened last week at Sunbury, Pa., for the construction of a branch line from Brady to Quaker Run, near Mt. Carmel. New coal mines are being opened and their big output will be shipped over this line.

**Philipsburg, Ebensburg & Johnstown.**—This company was incorporated in Pennsylvania to build a railroad beginning near the village of Janesville, Clearfield County, thence west to Johnstown, connecting at that point with the Baltimore & Ohio; also branches to coal mines, and to connect with the Altoona, Clearfield & Northern at a point between Dougherty & Wapsonock. The length of the road, including the branches, will be 48 miles. Samuel P. Langdon, of Philadelphia, is President.

**Pittsburgh & Eastern.**—A charter was issued to this company at Harrisburg, Pa., on March 20. It is proposed to build from a point near Crab Tree, in Westmoreland County, to a point near White's Station, in

Indiana County, a distance of 10 miles. The capital stock is \$250,000; S. H. Hicks, of Philadelphia, is President.

**Plant City, Opeechobee & Lake Worth.**—This company was incorporated in Florida to build a railroad from Plant City, to Lake Worth, a distance of 150 miles. The incorporators are: T. B. Mills, President; C. W. Stevens, Vice-President and General Counsel; G. B. Baker, Secretary and General Manager.

**Poland Springs.**—This company has been recently incorporated to build a short railroad in Maine to Poland Springs, and the projectors are now applying to the State Railroad Commissioners for their approval of the charter and the route. The line will be standard gauge, connecting with the Grand Trunk near the station at Lewiston Junction and extending west four or five miles to Poland Springs. The Portland & Rumford Falls Railroad has a line to Poland Springs, and that company will probably oppose the new project at the hearing before the Railroad Commissioners. The directors of the new company are Edward P. Ricker, H. W. Ricker, W. C. Wedgwood, of Lewiston, Me., and Jacob S. Winslow, of Portland.

**Quebec Central.**—Holt & Lukes, of Sherbrooke, Que., the contractors for the extension from Tring to Megantic, Que., about 50 miles, will receive proposals up to April 10 for the grading of the line in 5 and 10 mile sections.

**Savannah, Americus & Montgomery.**—General Manager Cecil Gabbett, of Montgomery, is quoted in a local paper as stating that an effort is now being made to purchase the branch of the Savannah & Western between Lyons and Meldrim, near Savannah, Ga., the junction of the main line of the Central of Georgia, to give this company a line of its own into Savannah. The road now extends from Montgomery, Ala., to Lyons, a point about 74 miles from Savannah. The bondholders are dissatisfied with the agreement with the Savannah & Western, which owns the line east of Lyons, and are now organizing a construction company in Baltimore to build an independent line into Savannah, or else purchase this branch of the Savannah & Western, and then complete the 17 miles between Meldrim and the city of Savannah. It is expected that the sale of the road will be ordered by the Superior Court when it convenes at Americus, Ga., next month, and if the road is purchased by the bondholders, as now proposed, the plan for an independent line into Savannah will be carried out.

**Savannah & Atlantic.**—The officers of the Central of Georgia, which operates this road, announce that it will be rebuilt and in operation between Savannah and Tybee Island on the Atlantic Coast, early in May. The contract to repair the roadbed, which was damaged by the South Atlantic storms in August, 1893, has been let and the work of rebuilding the line is now under way.

**South Jersey.**—E. A. Tennis, of Philadelphia, who has the contract for the branch of this line into Cape May, N. J., reports that the line will be completed to that town by June 1. This branch leaves the main line near Tuckahoe, and the track laying is completed from that point to the proposed crossing of the West Jersey Railroad and also south of the tracks of that company for about three miles. The construction material is being delivered by water at Dennisville, so that the objections raised by the West Jersey to the crossing of its tracks by the new railroad have not so far materially interfered with the construction of the Cape May line. The proposed crossing of the West Jersey tracks near Woodbine Station was the scene of some excitement last week which promised to develop into a "crossing war." The West Jersey resisted the proposed crossing and had 300 men at Woodbine who obstructed the tracks and derailed cars to prevent it. It also secured a temporary injunction against the new company to prevent it effecting the crossing, which is to be argued in April.

**Washington & Chesapeake Beach.**—Captain Mattox of Washington, D. C., the General Manager of this railroad, states that the sub-contracts on the entire road will be let next week, and the grading carried on on all the sections between Washington and Chesapeake Beach. Coffin, Sullivan & Co., of New York City, who have the general contract for building the railroad, have also been awarded the contract for building the pier at Chesapeake Beach, which is to be 2,000 ft. long.

**Western Maryland.**—Grading for the extension in York, Pa., is about finished and the tracklaying will begin at once.

**Yankton, Norfolk & Southwestern.**—Dispatches from Yankton state that work on this line has been taken up by J. S. Meckling, of Chicago, and other capitalists, and that it will extend from Le Mars, Ia., through Yankton to Norfolk, Neb., a distance of 130 miles. Part of the line from Yankton to Norfolk has already been graded. The dispatches state that the line from Le Mars to Yankton will, when completed, be operated by the Illinois Central.

#### GENERAL RAILROAD NEWS.

**Abingdon Coal and Iron.**—This railroad was sold at public auction at Bristol, Va., on March 22, to F. Fortune, the contractor, for \$38,000. The road is nearly all graded from Abingdon to Damascus, Va., a distance of 15 miles.

**Chicago & Northwestern.**—The earnings for February and the eight months of the fiscal year are reported in the following table:

|                           | 1894.        | 1893.        | Inc. or dec.   |
|---------------------------|--------------|--------------|----------------|
| Gross earn.....           | \$2,106,785  | \$2,276,912  | D. \$170,127   |
| Oper. expen.....          | 1,531,979    | 1,833,95     | D. 301,916     |
| Net earn.....             | \$574,806    | \$443,617    | I. \$131,189   |
| Eight months from July 1: |              |              |                |
| Gross earn.....           | \$21,911,264 | \$24,496,738 | D. \$2,585,473 |
| Oper. expen.....          | 14,157,316   | 16,178,662   | D. 2,021,315   |
| Net earn.....             | \$7,753,917  | \$8,318,075  | D. \$564,158   |

**Chicago, Burlington & Quincy.**—The arrangements for bringing the passenger trains into the Union Station at St. Louis was completed last week at a conference between the Burlington officers and President Taussig, of the Terminal Association. The Burlington passenger trains will be taken on the tracks of the Terminal Railroad between Carr street and Cass avenue, and will run on elevated tracks to Seventh and Gratiot streets. Thence they will run on a viaduct to be constructed across to and over the yards south of the old Union Depot. The viaduct will be brought down to grade before the Twelfth Street Bridge is reached, or, if this cannot be accomplished, the Twelfth Street Bridge will

be raised. Work on the viaduct will begin as soon as the plans are completed and estimates submitted.

The annual report for the year ending Dec. 31 shows the following results:

|                              | 1893.         | 1892.           | 1891.         |
|------------------------------|---------------|-----------------|---------------|
| Miles operated.....          | 5,596         | 5,556           | 5,324         |
| Gross earnings.....          | \$31,012,639  | \$33,001,393    | \$27,916,177  |
| Oper. expen.....             | 21,224,503    | 22,469,010      | 18,519,257    |
| Net earn.....                | \$9,818,466   | \$10,533,383    | \$9,396,870   |
| Other income.....            | 1,771,092     | 1,281,817       | 1,371,627     |
| Total.....                   | \$11,589,558  | \$11,815,200    | \$10,738,497  |
| Fixed charges.....           | 7,611,261     | 7,193,497       | 6,812,385     |
| Surplus.....                 | \$3,975,297   | \$4,621,703     | \$3,926,112   |
| Five per cent. dividend..... | 3,960,252     | 3,819,922 (14%) | 3,246,685     |
| Surplus.....                 | \$15,044      | \$801,781       | \$679,427     |
| Land receipts.....           | 108,422       | 188,571         | 156,844       |
| Gross earn. per mile.....    | 1893. \$5.582 | 1892. \$6.043   | 1891. \$5.282 |
| Net earn. per mile.....      | 1,768         | 1,929           | 1,773         |

**Georgia Pacific.**—The Richmond Terminal reorganization committee has obtained a decree of foreclosure of this railroad and the property will be pressed to a speedy sale.

**Louisville Southern.**—The Committee of Bondholders, which has been endeavoring to have the Drexel, Morgan & Co. reorganization plan remodified, have decided to accept the plan as offered, and have recommended its acceptance to the bondholders.

**Mexican Central.**—Regarding the City of Mexico dispatch that President A. A. Robinson, of this company, has left Mexico for New York and Boston to recommend acquisition of the Mexico, Cuernavaca & Pacific Railroad in the Contra's interest, and the abandonment of the concession to build from Guadalajara to San Blas, nothing is known at the headquarters of the company in Boston. The road mentioned is built some 20 miles out from the City of Mexico by Mr. J. H. Hampson, who has the concession for the line to the Pacific Coast. It is also yet to be determined whether the Mexican Central concession to San Blas is to be surrendered. The company will have to file plans this season if it intends to build to the Pacific or obtain an extension of the concession. The subject is under consideration.

**New York & New England.**—The adjourned annual meeting was held in Boston last week and new directors were elected, representing Boston interests. Chairman Waterbury, of the Reorganization Committee, made a brief statement of the plan for reorganization. The company needs \$6,700,000 altogether. There is needed to pay accrued interest and all floating debt liabilities \$3,532,906. There are assets of \$2,000,000 against this, including the \$750,000 of Providence & Springfield bonds, which should be left in the treasury of the company or for use for improvements in that section. No account is taken of the Richardson's Wharf note of \$300,000. The General Manager's requirements are \$900,000, including \$250,000 for rails and \$500,000 for new equipment. Repairs of bridges will call for \$100,000 and reduction of grade crossings for \$34,344, without considering Boston grade crossings. Necessary improvements call for \$1,872,485, making a total of \$6,746,815.57.

These figures are subject to revision by the Committee. Cash is not at once needed for all these improvements, but net earnings cannot be depended on in the light of past experience, and cash or securities must be furnished for the future. The Committee is now considering the value of the leased lines, and no exact reorganization plan can be formulated until these have been determined.

Judge Wallace, of the United States Circuit Court at New York, has handed down his decision on the application of Thomas C. Platt and Marsden J. Perry, Receivers of the railroad, to be allowed to issue receiver's certificate to the amount of \$1,500,000, to be a first lien on the property of the road. He ordered that the petition be adjourned until the petitioners have applied to the United States Circuit Court judge of Massachusetts for relief and final order; and if the petition is granted in Massachusetts, a similar one may be made in New York.

**Peoria, Decatur & Evansville.**—The first mortgage bondholders have appointed a protective committee, consisting of: Walston H. Brown, Chairman; A. White, E. H. Ladd, Jr., Morton S. Paton and Charles A. Peabody, Jr. This committee is empowered to ask for the co-operation of all the other first mortgage bondholders of both divisions and to institute foreclosure proceedings.

**Philadelphia & Reading.**—The Receivers of the company have presented a petition in the United States Circuit Court, asking authority to enter into the contract provided by the ordinance of the Philadelphia Council for carrying out the various constructions along the Reading and Reading Terminal lines in completing the elevated road, and for building the subway under Broad street and abolishing grade crossing. The estimated cost of the work is \$6,000,000. An agreement was made with the city for the Reading to pay one-half of the interest upon the cost, not exceeding \$3,000,000, and one-half of the amount of the principal of the loan as it should fall due after the end of 10 years, the principal of the loan to be made payable in 20 annual installments, beginning 10 years after date.

The Receivers have petitioned the Court for authority to surrender the lease of the Susquehanna Canal Co., which operates the canal from Columbia, Pa., to Havre de Grace, Md.

**Providence & Springfield.**—The Supreme Court at Providence, R. I., has enjoined the City Counsel and the Mayor of Providence from indorsing and guaranteeing \$750,000 of the bonds, issued by this railroad and held by the New York & New England under the lease of the Springfield, the reason for the injunction being that the New England proposed to sell the bonds and use the proceeds for construction purposes outside of the state.

**Quaker City Elevated.**—The arguments of the attorneys on the appeal taken by the company from the decisions of the Masters appointed by the Common Pleas Court in the right of way injunction proceedings will be argued in the Superior Court at Philadelphia on April 2. The arguments in the injunction proceedings against the Northeastern Elevated Railroad will also be heard at the same time, as both companies were chartered under the same acts of the State Assembly and the same questions of law are involved.

**Richmond & West Point Terminal.**—Messrs. Drexel, Morgan & Co. announce that the holders of more than 75 per cent. in amount of various bonds of the Richmond Terminal and allied companies have assented to the modified plan of reorganization of Feb. 20.

**Texas & Pacific.**—The annual report for the year

ending Dec. 31 gives the following results of the year's business:

|                     | 1893.       | 1892.       | Inc. or dec. |
|---------------------|-------------|-------------|--------------|
| Gross earnings..... | \$7,334,294 | \$6,987,701 | I. \$346,592 |
| Oper. expenses..... | 5,217,922   | 5,184,944   | D. 267,024   |
| Net earnings.....   | \$2,116,371 | \$1,502,757 | I. \$613,614 |
| Other income.....   | 117,768     | 115,920     | I. 1,848     |
| Total.....          | \$2,234,139 | \$1,618,677 | I. \$615,462 |
| Fixed charges.....  | 1,574,244   | 1,557,710   | I. 16,534    |
| Surplus.....        | \$659,895   | \$60,967    | I. \$598,928 |
| Betterments.....    | 132,818     | 204,124     | D. 71,606    |
| Surplus.....        | \$527,078   | \$143,457   | I. \$367,534 |

The following show changes in important items:

|                           |           |           |            |
|---------------------------|-----------|-----------|------------|
| Gross earn. per mile..... | \$4.892   | \$1.892   | I. \$231   |
| Net earn. per mile.....   | \$1.11    | \$1.002   | I. \$109   |
| Tons freight moved.....   | 1,790,085 | 1,670,607 | I. 109,418 |
| Rate per mile.....        | 1.16c.    | 1.14c.    | I. .02c.   |
| Passengers carried.....   | 1,167,449 | 1,171,144 | D. 6,695   |
| Rate per mile.....        | 2.55c.    | 2.56c.    | D. .01c.   |

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